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## F01 Workbook - Module 3

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# Workbook - Module 3

## Model: F01/F02

## Production: From Start of Production

# OBJECTIVES

After completion of this module you will be able to:

- Understand basic systems and functions of the CIC on the F01/F02.

- Locate and identify CIC system components.

- Understand the changes to the instrument cluster.

- Describe the Telephone systems.

- Understand Personal Profile on the F01/F02.

- Describe the operation of the Rear Seat Entertainment RSE system.

- Understand the operation of the IHKA 4 zone system on the F01/F02.

- Identify the components of the IHKA 4 zone system.

# Car Information Computer

The Car Information Computer (CIC) replaces the previous CCC (Car Communication Computer). (CIC) was introduced to the US market on the 1 Series and the 3 Series in 2008. The system is now installed in the 7 Series (F01/F02) with many new features and functions, like the Owner's Manual intergerated in the CIC.

The screen size in the F01/F02 CIC has increased to 10.2" (diagonal). The number of pixels have doubled from 640x240 (CCC) to 1280x480. This provides improved visual quality by generating a sharper display.

The main noticeable feature of this iDrive system is the newly designed controller that is now equipped with seven direct access buttons.

These buttons provide shortcuts to the menus in the redesigned layout of the user interface.

It is now possible to access the following menus directly:

- Main menu
- CD/Multimedia
- Radio
- Navigation
- Telephone

The "Back" button can be pressed to go back up to 30 steps. The "Option" button makes it possible to make fine adjustments or carry out special functions in the last selected submenu.

The CIC combines the following control units in one enclosure:

- Navigation computer, HIP module and yaw rate sensor
- AM Tuner
- FM Tuner
- FM-RTTI Tuner
- IBOC decoder
- Audio system controller with music search database
- MOST-CAN gateway
- Interface to control display (LVDS)

The CD-DVD player is incorporated into the CIC. It is now able to play video DVDs on the front CID when the vehicle is stationary and in the "Park" position. When the vehicle is in gear and/or moving only the audio track of the video will be played.
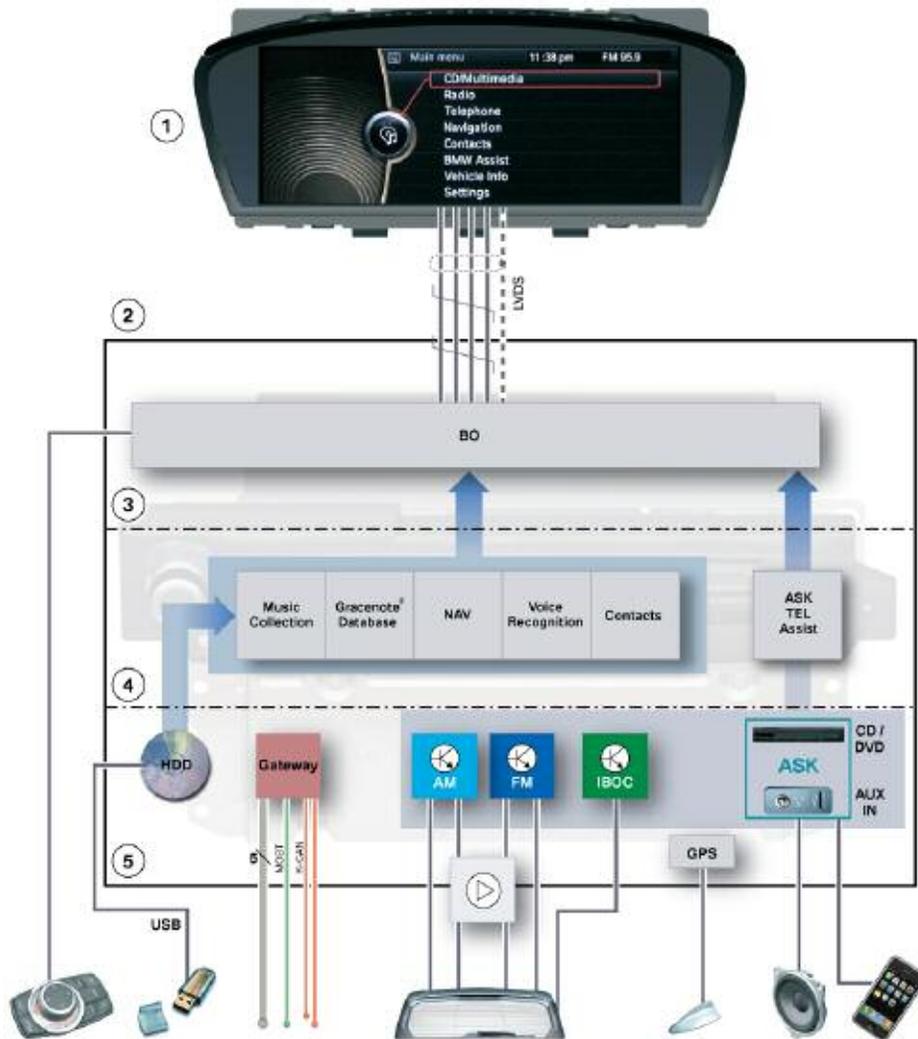
| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Central information display (CID | 4 | Application software |
| 2 | Car Information Computer (CIC) | 5 | Hardware |
| 3 | User interface (BO) | | |

## Navigation

The navigation system is implemented in the CIC head unit by incorporating a hard disk, a GPS receiver module and the yaw-rate sensor into one device.

Of the total 80GB of space 65GB are reserved for the navigation data on the hard disk. (The size of the hard disk and partitions are subject to change)

Maps are displayed much faster due to the map data being stored in the hard disk and the increased processing power of the CIC.



**View of the Navigation System's "Speller" for Entering Destinations**

The CIC speller entry interface simplifies the destination entry procedure.

The menu located at the top right, next to the speller, shows the last three place names entered.

After entering several letters, a preview map will be shown in the assistant window to facilitate the destination entry.

Navigation destinations can also be entered based on their ZIP code using the speller symbol 1@+.

Compared to the CCC, entering the destination using the voice recognition system has been made considerably easier. Many new commands are now possible using the voice recognition system.

The navigation system has been enhanced with the following functions:

- Full-screen map display
- Interactive map
- Night view
- Trip/route planner and guide tours.
- Lane recommendation
- 3D models in the perspective map view

## Interactive Map



**Interactive Map View**

The interactive map is another option for entering destinations.

In addition to horizontal and vertical navigation there is also the option of diagonal navigation within the map screen view.

The auxiliary line for entering the destination can now be moved diagonally by pushing, pressing and turning the controller.

A destination location appears in the crosshairs, it is shown highlighted and now it can be selected as the destination.

Because the controller can be moved in all directions, interactive map is an excellent tool for checking if there are any defects in the controller or CIC head unit operation.

The navigation-system outputs can also be displayed on the instrument panel display or in the Head-up Display.

## Night View



**Night Map View**

A night view for map presentation can be activated under Settings - Map Options.

This view uses colors that are easy on the eye in darker conditions. In this mode streets and roads are highlighted and the surroundings shown darker. The night view can set to automatic mode through the settings menu.

**Note: If traffic information is selected the night mode is no longer displayed.**

## Trip Planner

Up to 30 stages can be entered when selecting a destination with the route planner. The trip or route planner is located in the "Options" menu of the navigation system.  The entry "Trip with several stages" must be selected to activate this function.



**Trip/route Planner Screen**

Flags mark each stage destination in the map view. Routes put together by the user can be renamed and saved in the "Options" menu. The planner does not propose alternatives for routes put together by the user.

## Extended Intersection View
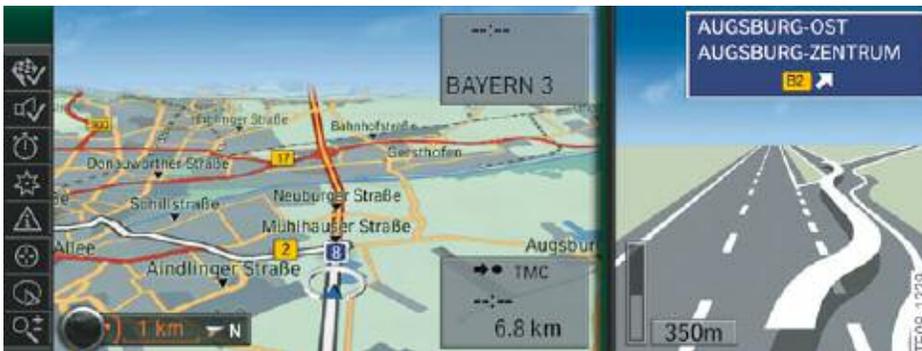


**Intersection View**

When guidance is active, an extended intersection view can be viewed in the assistant window when the car approaches an intersection. This function can be particularly helpful on multi-lane arteries with closely spaced exits, helping the driver deal easily with the problems of lane changes in heavy traffic.

The information in the assistant window is shown only for the duration of the turn-off procedure for each individual place of interest along the route.

## Perspective View



**Perspective  City View**

This is a particularly good way of viewing the land marks and landscapes.

The buildings in major cities are displayed at a scale setting from 25 to 100 meters.

Landmark buildings are shown in near-photo quality to facilitate orientation, especially in full-screen mode.

Contours of the countryside are displayed as a 3D model in the perspective map view when traveling over open terrain.



**Perspective View of a Landscape**

## Lane Change Recommendation

It is also possible to view the navigation-system information in the instrument panel. Along with the arrow pointers with intersection zoom and distance to the next turn-off, a lane-change recommendation is also shown.



**Navigation-system display in the instrument panel**

## Head-up Display

Navigation-system information can also be shown in the Head-up Display (HUD). In this case, too, along with the arrow pointers with intersection zoom and distance to the next turn-off, a lane-change recommendation is shown. Long street names are shortened accordingly.



**Navigation-information display in the Head-up Display**

## Map Updates
The maps data can be updated in two different ways:

• Updating via the BMW programming system

  In this case, the map data in the CIC is updated through the Ethernet connection in the diagnostic connector. The data is enabled by means of an enable code that needs to be downloaded and entered into the BMW programming system.

• Using a complete Map DVD set

  The DVD is loaded directly into the head unit. The enable code can then be entered directly into the iDrive system by the customer or service technician using the "speller".

# CD/Multimedia

The hard disk drive in the CIC also makes it possible to compile and store a personalized music collection.  Music files can be converted (ripped) or copied for the music collection on the hard disk. Stored on the CIC hard disk, fast access to these music files is ensured at all times.

**Hard drive disk with the individual partitions.**
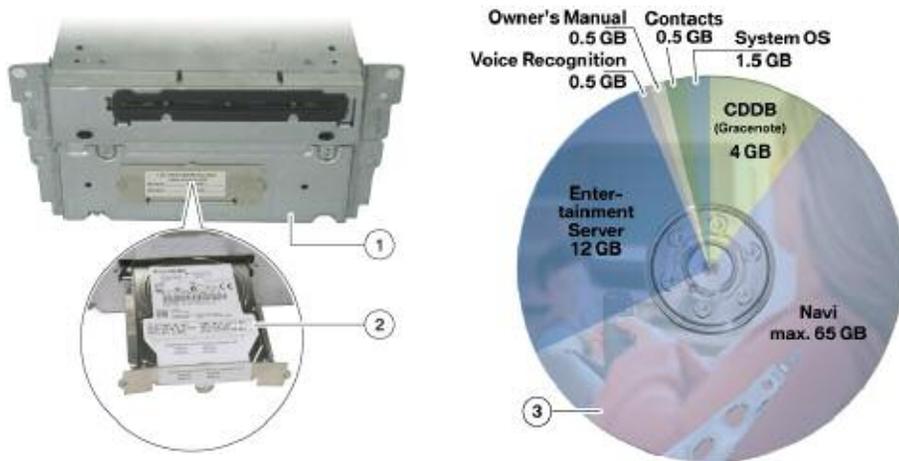


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Car Information Computer | 3 | Pie diagram with the individual hard disk partition |
| 2 | Hard disc (slide-in tray) | | |

An 12GB section of the total 80GB hard disk is dedicated to store music files. The files can be ripped from audio CDs, DVDs or USB sticks.

A USB interface is provided in the glove compartment for import/export purposes (data copy or data backup).

Along with the music data files, the music track database (Gracenote®) is also stored to be used for the music search function.



**Import/export USB port in the glove compartment.**

The following three options can be used to store music data on the hard disk:

- Rip function
  - This function rips commercially available audio CDs (marked with the Compact Disc Digital Audio logo)

- Copying data via the CD/DVD drive
  - Self-recorded CD/DVD with audio files in MP3, WMA or AAC (M4A) format can be read, copied and stored via the CD/DVD player (drive).

- Copying data via the USB import/export port in the glove compartment
  - The data contained on a USB stick (music files in MP3, WMA or also AAC format) can be imported via the special USB port in the glove compartment.

The files must be located in the first partition of the USB stick in order to be recognized and processed.

USB sticks conforming to the standard USB 1.1 are supported. However, the standard "High-Speed" 2.0 is recommended.

Depending on the USB lead used, the mass storage device may be able to be charged through the USB interface.  However, the power consumption of the mass storage device must not exceed the maximum draw of 500 mA permitted.

USB hard drives, USB hubs and USB memory card readers with several slots cannot be read when connected to the USB jack in the glove compartment.

It is not advisable to copy music data from audio players (MP3 player, iPod®) using the import/export USB connection.

In this case, the copied folder names will be represented by cryptic characters instead of an album title. This makes a subsequent search for a music file virtually impossible.

## CAUTION!!!

**Connecting a device to a USB import/export interface for charging can cause damage the external device as well as to the connected control units if the maximum draw exceeds 500mA.**

### Music Collection Back-up
The customer has the option of saving his/her complete music collection under the "Options" submenu. This is achieved by copying to a USB stick.

For this purpose, it is necessary to ensure that the USB stick has sufficient storage capacity. A minimum USB storage capacity of 12 GB is currently required for backing up the music data.

The process is similar to the data saving procedure on a PC. This function makes it possible to import data when changing vehicles or when replacing a head unit.

Data saving will only be possible if the hard disk of the CIC has not been damaged and the interfaces to the CIC are still fully operational.

When programming the vehicle after replacing control units, the music data could be irretrievably lost without saving (backing up) the music collection.

Instructions on how and where to backup the music collection are provided in the Vehicle Owner's Manual.

**Note: For copyright reasons, the service personnel are not permitted to perform the data backup for the customer.**

### Music Search
The CIC is equipped with special software provided by Gracenote® for the purpose of identifying the complete albums of ripped Digital Audio CD.

The information for the music search is stored in the form of a metafile, similar to the ID3 tags of an MP3 file.

A 4 GB partition is allocated to music search on the hard disk of the CIC for the purpose of managing the music file metadata.

The music search performs a special filtering process that reads and interprets the metadata available for the individual music file to identify it.

**Note: CDs are identified based on the number of tracks and the track length. This generally only functions with original digital audio CDs or 1 to 1 copies created with special burning programs.**

## Updating the Music Track Database (Gracenote®)

To keep the entire contents of the music search database up to date, BMW Service is equipped with the latest CD of the music track database (Gracenote®).

The CD can be loaded directly in the CIC drive and updated via the Service menu of the CIC.

The update of the music track database (Gracenote®) will apply only to future WMA music files conversions (rip function) of Digital Audio CDs.

**Gracenote Update CD**

Metadata will no longer be added to files that were ripped before the update of the music track database (Gracenote®).

The reason for this is that the music track database is only accessed when a Digital Audio CD is loaded and subsequently ripped.

## The Service Menu of the CIC Head Unit

The controller can be used to activate the Service mode functions.

The Service mode is a special facility which provides information about the status of the display and user control system.

The Service mode can be used, for example, to read out hard-

ware/software versions for the Central Information Display or control units in the CIC system network.

As an addition to the comprehensive facilities of the diagnosis system, the Service mode serves as a simple means of quickly accessing diagnostic data without a BMW diagnosis system.

### ■ Activating the Service Mode

In the main menu, push the controller forwards and hold there for longer than 10 seconds.

Tactile feedback will then be generated.

Then proceed as follows:

- Turn the controller 3 stops clockwise
- Turn controller 3 stops anticlockwise
- Turn controller 1 stops clockwise
- Turn controller 1 stops anticlockwise
- Turn controller 1 stops clockwise
- Press the controller; the Service mode is added as the last menu item in the "Settings" menu.

**Note: Push the controller in any direction to return to the main menu.**

Four selection menus are available in the "Service menu" of the CIC:

- Navigation
- Telephone and BMW Service
- TV (Not available in the US)
- Gracenote®

## Resetting the CIC

The Car Information Computer can be reset by pressing the rotary push button (ON button) for 25 seconds.

After 25 seconds, the control display becomes blank as a confirmation that the CIC is being restarted.



**CIC Start Screen After a Successful Reset**

**Note:   When resetting the MOST control unit,
         the MOST gateway is muted for 2 seconds.**

# Audio System

The Car Information Computer can be combined with the following speaker and amplifier systems:

- HiFi system (12 speakers)
- TOP-HiFi system (16 speakers)

### HiFi Amplifier
The Audio signals are transmitted in analog form from the head unit to the HiFi amplifier. The internal digital equalizer adapts the audio signals specifically to the vehicle, as determined by the coding. The iDrive does not equalize any signals.

### Top HiFi Amplifier
The Top-HiFi amplifier is located in the rear left of the luggage compartment behind the side panel trim. It is cooled by it's own cooling fan.



| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | MOST connection | 3 | Power supply, audio signals to speakers |
| 2 | Reserved for load/logic separation, 10th channel preparation | | |

The audio signals and the control signals are sent in digital form to the Top-HiFi amplifier through the fiber-optic cable (MOST). Programming, coding and diagnostics are carried out via the MOST.

The Top-HiFi amplifier supports **Dolby Pro Logic II** which processes sound information from the existing stereo signal.

This process replaces Logic 7 known from other BMW vehicles. A surround sound effect can be computed from the stereo signal, which consists only of a left and right channel.

The signals of the individual channels are output with time correction from the 16 available speakers of the Top-HiFi system in the F01/F02. This produces a homogeneous sound effect for the listener in 7.2 format. (seven mid-range/treble channels and two central bass channels).

**Note: For detailed information refer to the  F01/F02 Audio System training material available on TIS and ICP.**

As with the 3 Series CIC, the audio system uses a triple tuner which combines an AM/FM double tuner with a third FM-RTTI tuner module.

One tuner plays the current station as the second  searches, maintains and updates the station lists. The third module in the tuner network is used for the FM-RTTI (Real time traffic information) functions.  The RTTI messages are used by the navigation system for displaying traffic information.

The incorporation of an interference suppression filter enhances long distance AM range reception.

Devices such as IBOC and GPS are integrated into the CIC unit, this adds flexibility and expands the system's functions.

The audio system is comprised by the following components:

- Head unit, Car Information Computer CIC

- Amplifiers and speakers

- Antennas

- Digital tuners

- Peripherals
    - DVD changer
    - USB/audio interface
    - Smartphone integration option

The IHKA control unit is integrated into the IHKA/audio control panel.

The following applications of the CIC are stored on the integrated hard disk:

- Music collection

- Music track database (Gracenote®)

- Navigation software (application)

- Navigation map material

- iSpeech (voice recognition system)

- Contacts (database with address book data)

## Favorite Buttons
The eight programmable favorite buttons can now also be assigned a submenu such as "CD/Multimedia", "Music collection" or "External devices"

The buttons have two operating modes:

- Short press : Activation of button assignments

- Long press: Storage of function currently shown in the CID

The long press function stores:

- The required audio media: Radio stations, CD, DVD player or DVD changer access

- Navigation destinations: However, they must already be stored under "Contacts" or entered from "Last destinations"

- Phone numbers

**Front view of IHKA/audio control panel of the F01/F02**



| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Selector button for FM and AM | 4 | Eject button for DVD/CD player |
| 2 | MODE button for selecting audio sources | 5 | Station search/track "forward and back" |
| 3 | CD/DVD slot | 6 | Eight freely selectable favorites buttons |

**Circuit Diagram of head unit CIC including tuner**
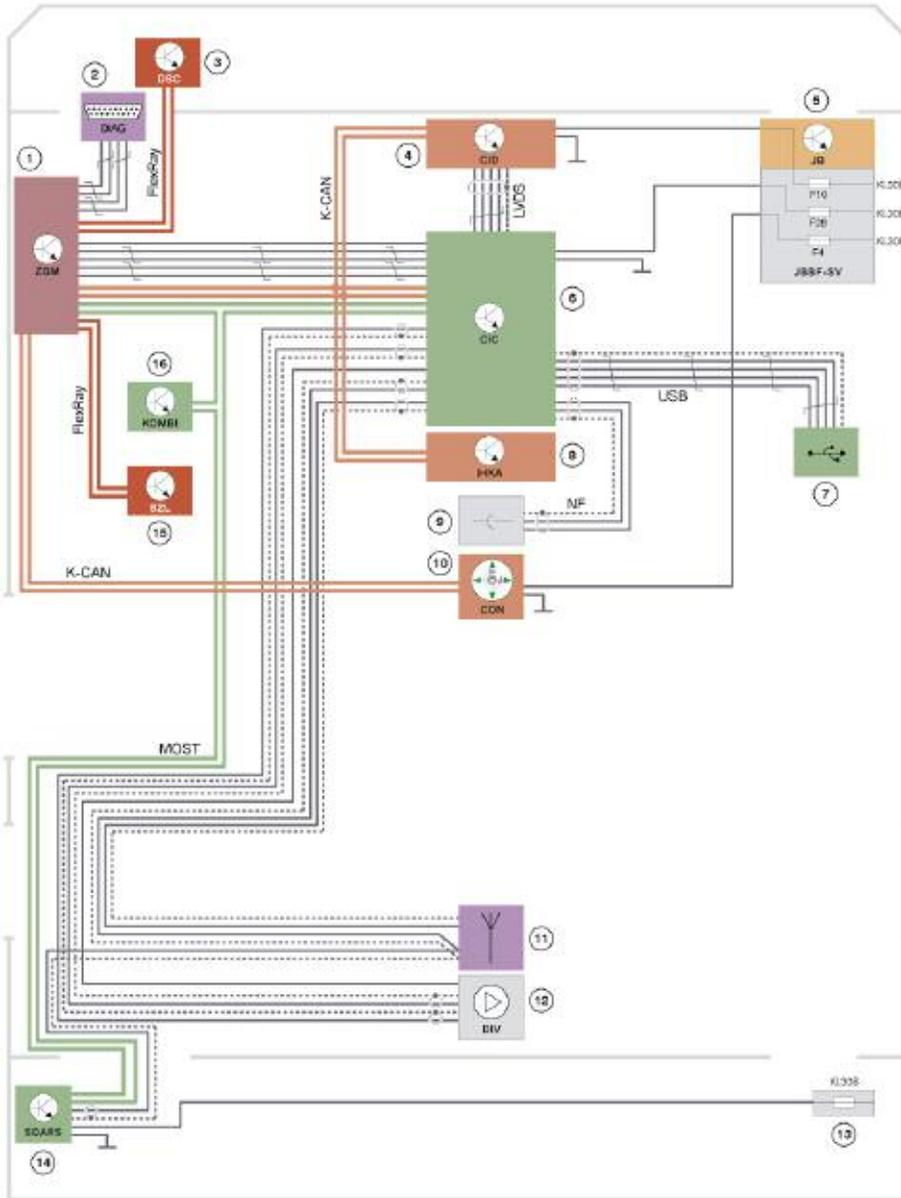


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Central gateway module | 12 | Antenna amplifier with diversity |
| 2 | Diagnosis interface | 13 | Rear power distribution box |
| 3 | Dynamic stability control | 14 | SDARS satellite radio tuner |
| 4 | Central information display | 15 | Steering column switch cluster |
| 5 | Junction Box electronics module with power distribution box | 16 | Instrument cluster |
| 6 | Car Information Computer | LVDS | Low voltage differential signalling |
| 7 | USB port in glove compartment | MOST | Media Orientated System Transport |
| 8 | Automatic climate control | USB | Universal serial bus |
| 9 | AUX-In connection in center console (jack plug) | FlexRay | FlexRay bus system |
| 10 | Controller | K-CAN | Body CAN |
| 11 | Roof antenna | | |

# Smartphone Integration

It is now possible to connect to and play back (through the iDrive system) music tracks stored in a mobile phone. Currently, only the iPhone may be integrated in the vehicle network by means of the Smartphone Integration audio link.

Smartphones may be connected through the USB Y cable or through the installation of a Smartphone integration snap in cradle adapter, available as option 6NF.



**Location of USB hub at left-hand B-pillar**

The audio files can be selected and played from the submenu "External devices" in the "CD/Multimedia" iDrive menu.

This feature works independently from the iPod/USB interface.

The new AUX-In connection features an internal switch function to accommodate both the USB interface and the Smartphone integration options.

It is possible to select audio from the snap in cradle or, switch to an external audio device connected to the (AUX) audio jack or Y-cable to the ULF-SBX-High. The switch between devices is triggered by inserting a plug in the (AUX) jack.

The following illustration shows the arrangement of the individual components on the base plate for the Smartphone Integration.

**Individual components on the base plate for the Smartphone audio link**



| Index | Explanation |
|-------|-------------|
| 1 | Base plate connection to roof antenna (black connection) |
| 2 | USB connection from base plate to USB hub (blue connector) |
| 3 | 18-pin plug connector: (power supply, cradle-on, AUX-AF signals) |

The electronic control module is installed in the base plate of the phone cradle. The link to the USB hub and AUX-In connection are already integrated in the vehicle wiring harness.

## Audio Data Control Line

The audio data of the snapped in cradle adapter for the mobile phone are controlled by a four-core USB data cable.

The base plate and cradle specifically developed for the Smartphone Integration option is immediately recognizable by the two gold-plated pin connectors.

These two gold-plated pin connectors are also used as lock pins for the snap-in cradle adapter.

Plastic pins are used in the same position in the standard snap-in telephone cradle adapters.

In this way it is possible to distinguish at a glance whether the correct base plate is installed for the Smartphone Integration option.

**Base plate for Smartphone Integration Option 6NF**
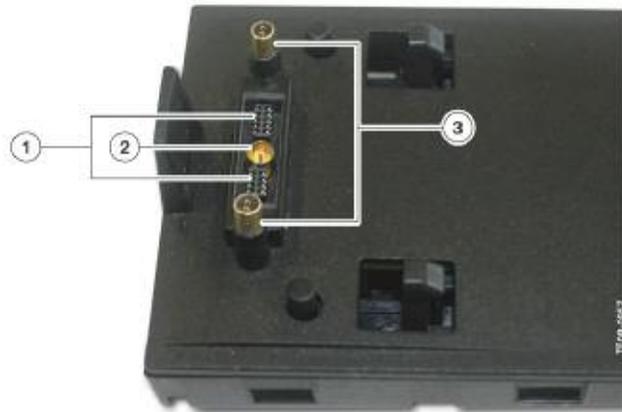
| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | 18-pin plug connector of base plate (power supply, cradle-on, AUX-AF signals) | 3 | USB connection: Distribution of the USB supply voltage and data lines over two gold-plated pin housings with shielding |
| 2 | Antenna connection to roof antenna | | |

## USB Hub

The USB hub allows multiple USB interfaces to be connected to the ULF-SBX High. The USB hub incorporates an active USB signal amplifier and is equipped with two USB inputs and one USB output.

**USB hub connectors**

| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | USB connection to AUX-in connection (blue connector) | 3 | USB connection to (ULF-SBX-High) interface box (black connector) |
| 2 | USB connection for base plate of the Smartphone audio link (neutral color connector) | 4 | Power supply for the USB hub (black connector) |

**Note: The USB hub is only used if the vehicle has the Smartphone Integration option.**

## Circuit diagram for the Smartphone Integration Option
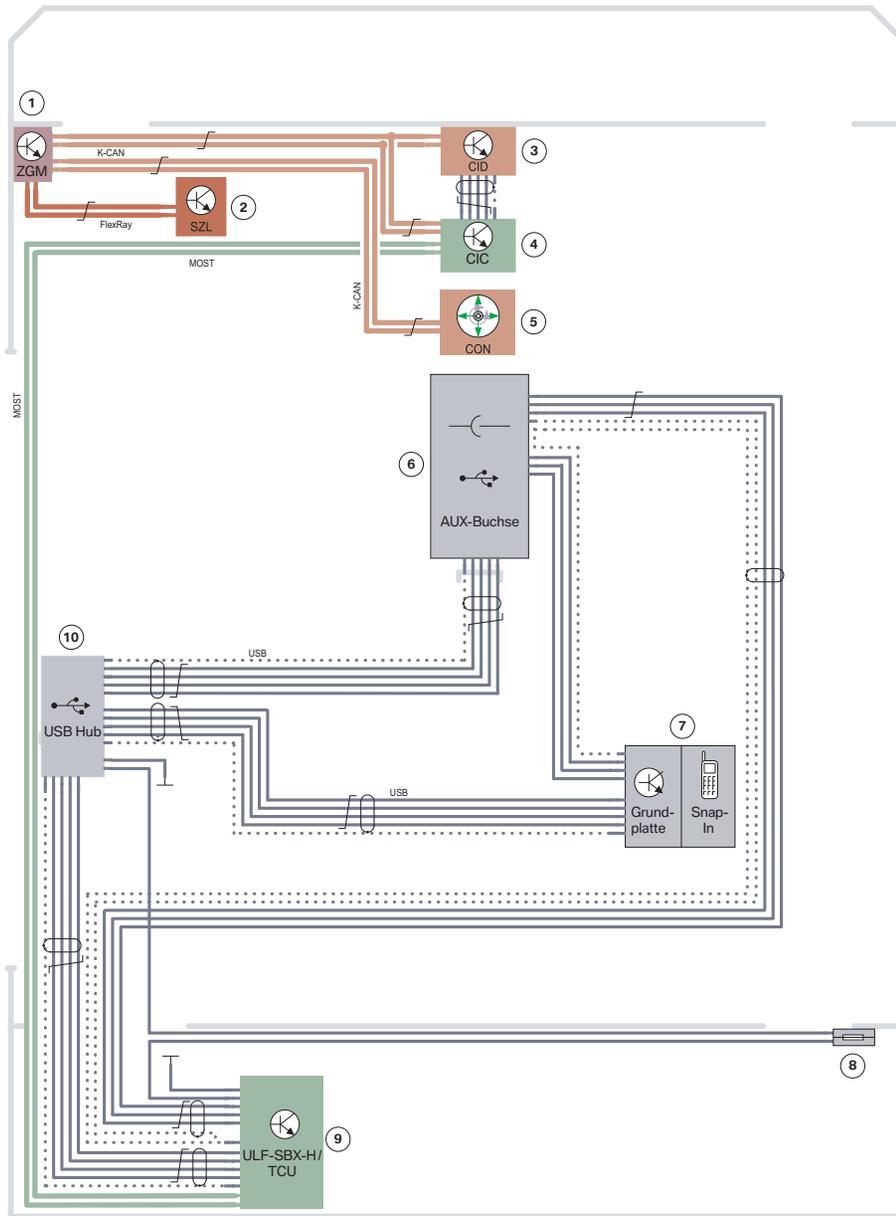


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Central gateway module (ZGM) | 6 | USB audio interface (AUX) |
| 2 | Steering column switch cluster (SZL) | 7 | Base plate with snap-in adapter |
| 3 | Central Information Display (CID) | 8 | Fuse in fuse carrier at rear right |
| 4 | Car Information Computer (CIC) | 9 | Interface box (ULF-SBX-H) |
| 5 | Controller (CON) | 10 | USB hub |

## Note: The Smartphone integration option is currently available only for IPhone.

The USB hub is installed behind the trim panel for the left-hand B-pillar.
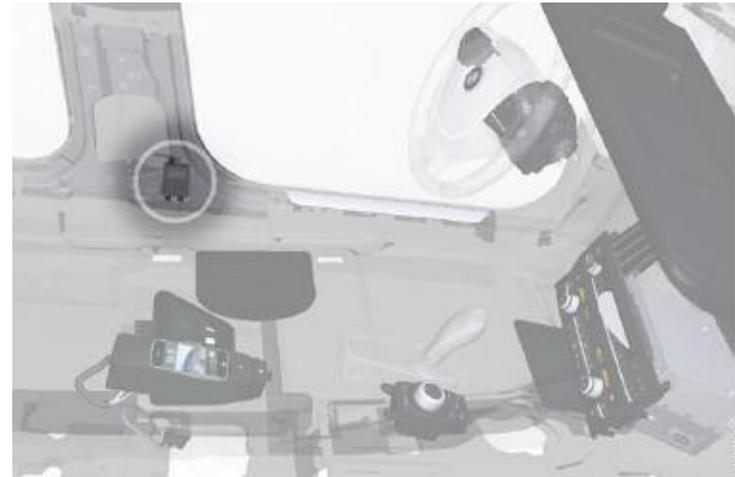


**Location of USB hub at left-hand B-pillar**

# Telephone

The ULF-SBX High interface box has been used in BMW vehicles since the introduction of E93.

The (SBX High) interface box is capable of performing the following tasks:

- USB connection for USB/audio interface
- Bluetooth interface with hands-free mode and phone book
- Basic voice input and activation system through the telephone.

Although both the ULF-SBX-H and the TCU may be fitted in a vehicle at the same time, the TCU always provides the telephone functions.  In this case the telephone functions are not available in the ULF-SBX High and the module is only installed to provide the "USB audio interface" option.

**ULF-SBX High  interface box connections**



The (TCU) and the (ULF-SBX-H) interface box control units are connected to the MOST bus.

The interface box decodes the digital audio signals collected through the USB interface. The audio files are then broadcast via the MOST.

The analog LF signals from the audio socket are also broadcast on the MOST.

The audio signal is transmitted digitally on the MOST bus to the HiFi amplifier and the amplifier distributes this signal to all the vehicle's speakers.

**Location of the ULF-SBX-High on rear left of the luggage compartment of F01/F02**
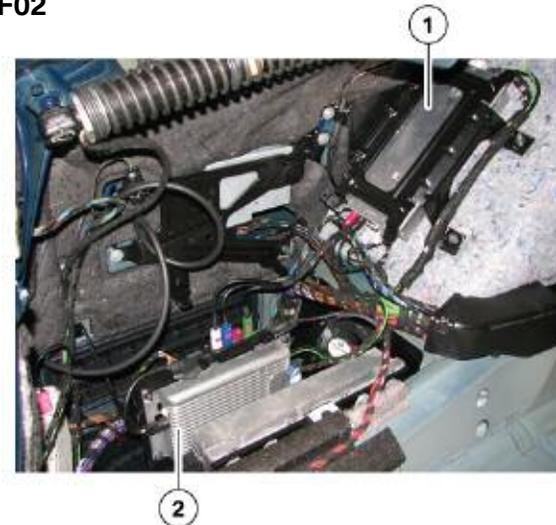


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Bluetooth connection | 3 | MOST connection |
| 2 | 54-pin connector | 4 | USB connection |

| Index | Explanation |
|-------|-------------|
| 1 | Telematics control  unit (TCU) |
| 2 | Interface box (ULF-SBX-High) |

**Inputs/outputs, of the SBX high interface box**
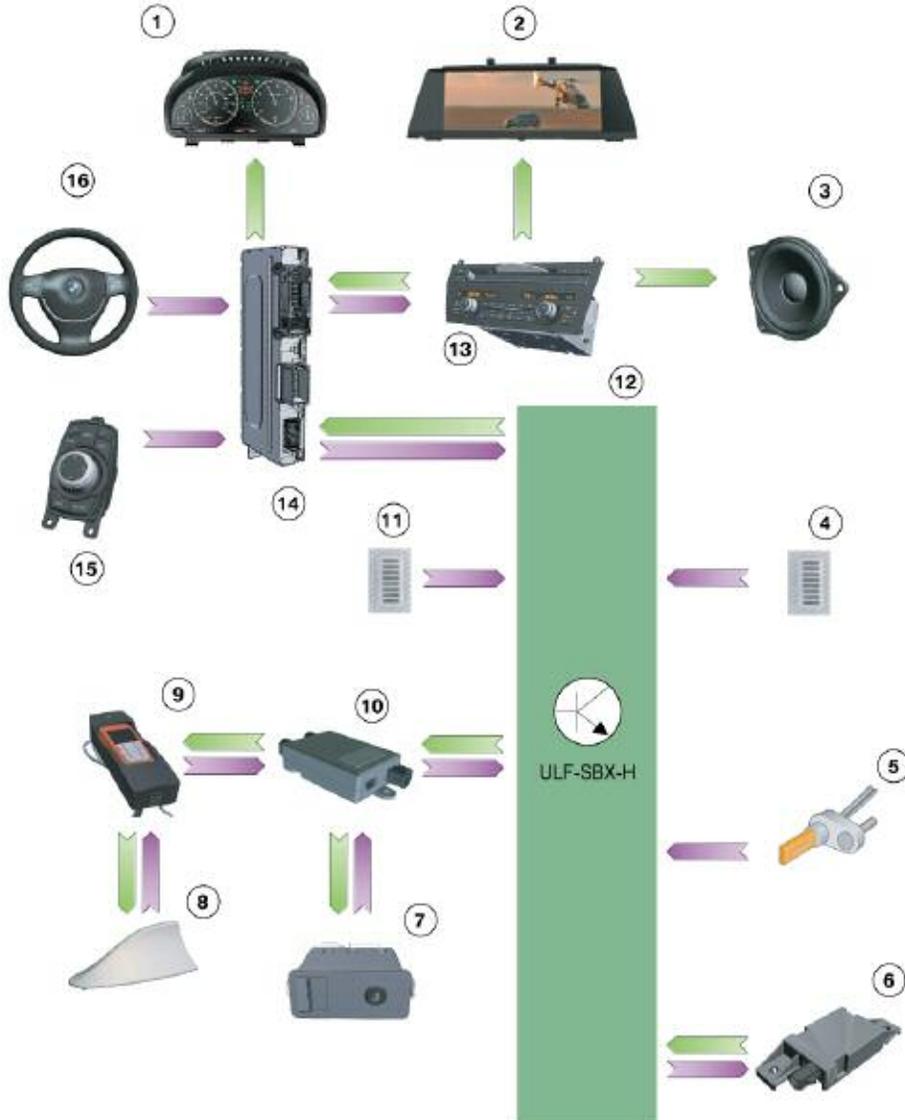


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Instrument cluster | 9 | Snap-in adapter with mobile phone |
| 2 | Central Information Display (CID) | 10 | USB hub |
| 3 | Speaker | 11 | Microphone (driver's side) |
| 4 | Microphone (passenger's side) | 12 | Interface box 'High' (ULF-SBX-H) |
| 5 | Wheel speed sensor | 13 | Car Information Computer (CIC) |
| 6 | Bluetooth antenna | 14 | Central gateway module (ZGM) |
| 7 | USB audio interface; if no USB hub is installed the connection is to the ULF-SBX-H | 15 | Controller (CON) |
| 8 | Roof antenna (for snap-in adapters for mobile phone | 16 | Multifunction steering wheel (MFL) |

**Note: Although the Telematics Control Unit (TCU) and the (ULF-SBX-H) interface box are both fitted in the vehicle, telephone functions are always implemented through the TCU.**

# Telematics Control Unit
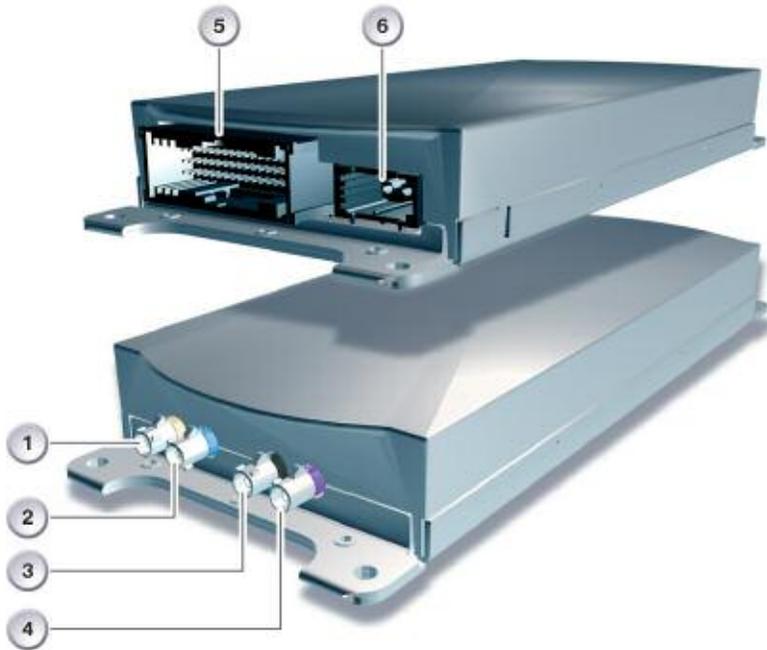


**TCU  Telematics Control unit for the F01/F02**

| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Connection, Bluetooth antenna transparent connector | 4 | Connection, emergency antenna purple connector |
| 2 | Connection, GPS antenna blue connector | 5 | 54-pin connector |
| 3 | Connection, roof and bumper antennae black connector | 6 | MOST connection |

The TCU used in the F01/F02 is similar to the TCU used in the E70.  The TCU always incorporates the GPS receiver and the GPS connection.

## Bluetooth Antenna

Communication between mobile phone and TCU, is through the Bluetooth antenna. The F01/F02 Bluetooth antenna was newly designed. It is smaller than the previous model and is located on the left B pillar near the roof.

**Note: For more information, see the F01 "Telephone System" training reference material available on ICP or TIS.**

## Microphones

There are two microphones installed in the F01/F02 in order to ensure that voice quality. One microphone is for the driver, the other is for the front passenger.

## Emergency-call GSM Antenna

The emergency-call GSM antenna is needed for the BMW ASSIST services as a back up.

**Inputs/outputs, of the TCU**
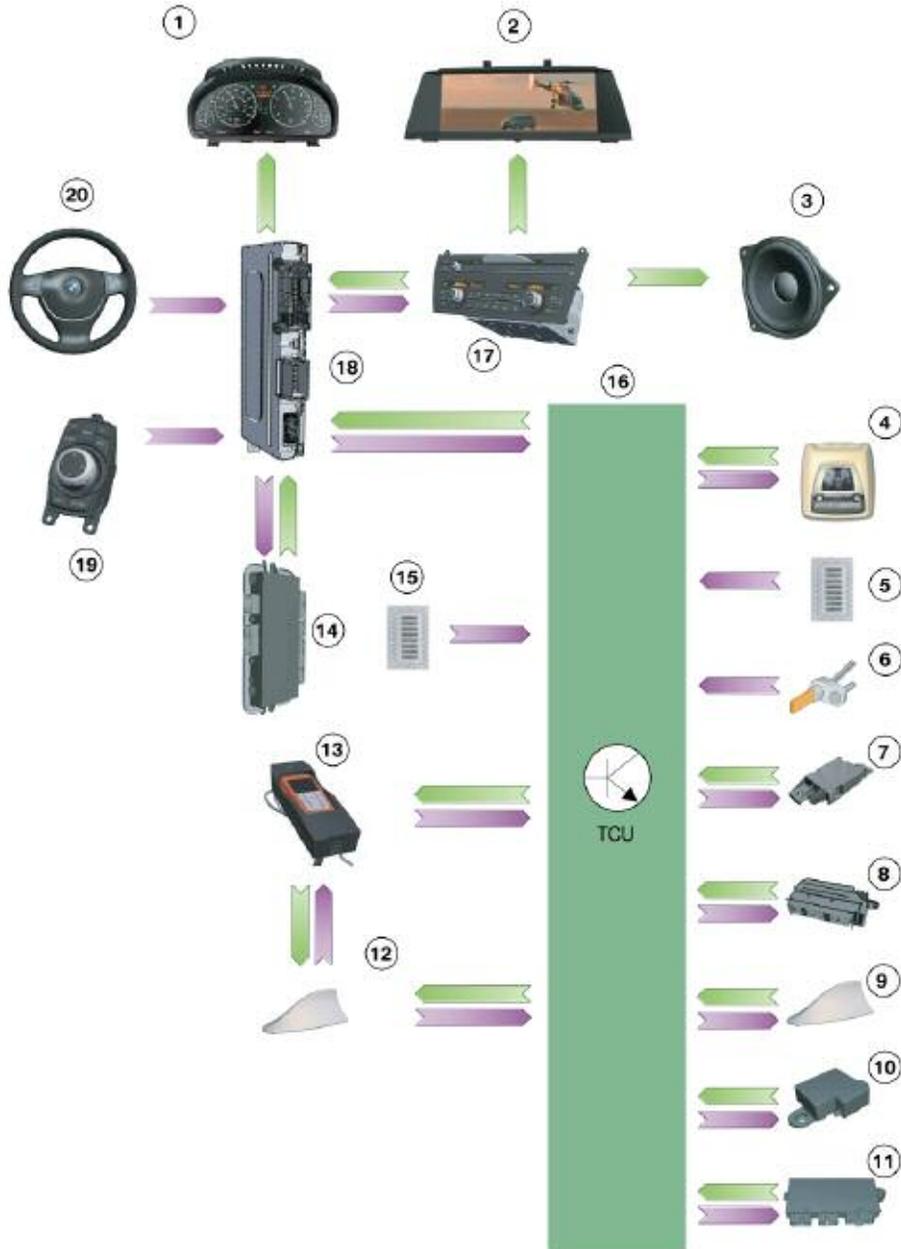


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Instrument cluster | 11 | Car Access System (CAS) |
| 2 | Central Information Display (CID) | 12 | Roof antennal for TCU and front snap-in adapter and internal telephone module of the TCU |
| 3 | Speaker | 13 | Snap-in adapter with mobile phone, front |
| 4 | Roof function module (FZD) | 14 | Footwell module (FRM) for remote door unlocking and remote door locking |
| 5 | Microphone (passenger's side) | 15 | Microphone (driver's side) |
| 6 | Wheel speed sensor | 16 | Telematics Control Unit (TCU) |
| 7 | Bluetooth antenna | 17 | Car Information Computer (CIC) |
| 8 | Crash safety module (ACSM) | 18 | Central Gateway Module (ZGM) |
| 9 | GPS antenna | 19 | Controller (CON) |
| 10 | Emergency-call GSM antenna (back-up) | 20 | Multifunction steering wheel (MFL) |

**Note: For detailed information on the F01/F02 Telephone system refer to the reference training material available on TIS and ICP.**
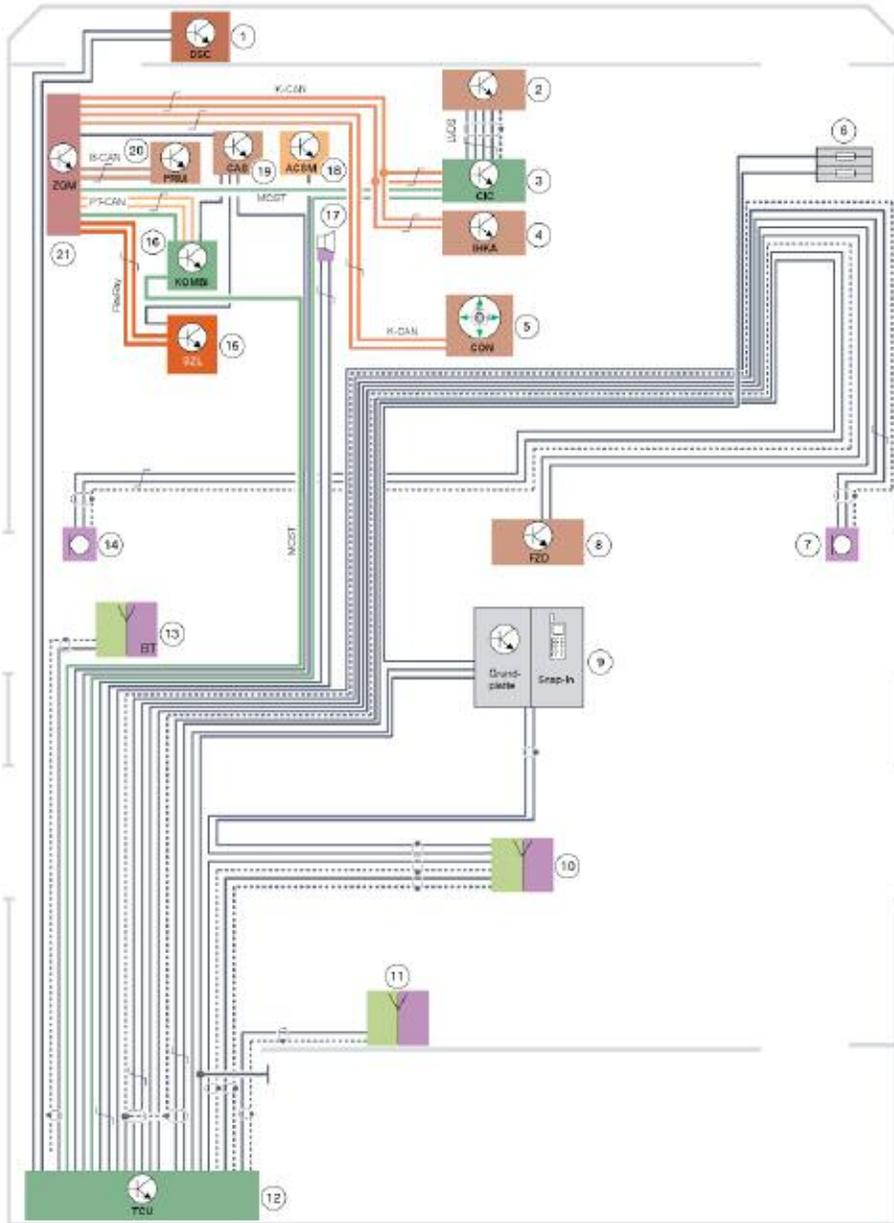
| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Dynamic Stability Control (DSC) | 12 | Telematics Control Unit (TCU) |
| 2 | Central Information Display (CID) | 13 | Bluetooth antenna |
| 3 | Head unit (CIC) | 14 | Microphone (driver's side) |
| 4 | Integrated automatic heater and A/C control (IHKA) | 15 | Steering column switch cluster(SZL) |
| 5 | Controller (CON) | 16 | Instrument cluster |
| 6 | Fuse in the junction box | 17 | SOS speaker |
| 7 | Microphone (passenger's side) | 18 | Crash safety module (ACSM) |
| 8 | Roof function module (FZD) | 19 | Car Access System (CAS) |
| 9 | Base plate phone snap-in adapter | 20 | Footwell module (FRM) |
| 10 | Roof antenna | 21 | Central gateway module (ZGM) |
| 11 | Emergency-call GSM antenna (back-up) | | |

## MOST signals on the control unit TCU

| In/out | Signal | Source/sink | Function |
|--------|--------|-------------|----------|
| In | GPS signals | GPS antenna to CIC | Position data |
| In | Control signals | CIC | Phone book, connection set-up, incoming-call acceptance, terminal control, etc. |
| Out | Audio signals | CIC | Audio signals, call recipient BMW ASSIST |
| Out | Audio signals | CIC | Audio signals, call recipient, mobile phone |

## Bluetooth Pairing (pairing wizard)

The pairing wizard for Bluetooth is found by selecting the "Telephone" menu and then selecting "Bluetooth".

The pairing wizard presents the step-by-step instructions for the entire pairing process via the Central Information Display (CID).

Up to four mobile phones can be paired with the car. Before a fifth mobile phone can be paired, one of the other four entries must be removed from the list.

## Multiple Calls

This function can be used to conduct two phone conversations at the same time.  Depending on the phone used, services such as call waiting, toggle calls and teleconferencing are now possible in the F01/F02.

### Call Waiting
A second call is incoming while a call is in progress. This is indicated by a call waiting tone and also by an accept/reject dialog in the display. The user can now reject the second call and continue the active call or accept the second call. In the latter case the first call is placed on hold and the held caller hears a call waiting melody.

### Toggle Calls
The "toggle calls" function can be used to toggle these calls between the "active" status and the "on hold" status.

### Teleconferencing
If the user has an active call and a call on hold, the "Conference" menu item can be selected to place all phone users in a shared conference call.

**Note:  Not all system compatible phones are capable of these features.  For more information see the list of compatible phones at www.wireless4bmw.com**

## Voice Activation

The voice activation system has been further developed to now enable even simpler and more fluid voice command inputs.

In the F01/F02 it is now possible to use spoken commands to administrate the contacts, phone book and address list. This means that three lists with up to 3000 entries can be operated by voice control.

Voice-assisted destination entry for navigation has been extended to include entry of intersections and zip codes.

With the new system the voice-input dialog remains open even if the controller is moved, so the user can immediately resume voice input to continue interacting with the system. This makes it much easier, for example, to enter a destination for the navigation system by selecting a street name from a list.

There is no beep between the individual steps in a dialog sequence.

There are now only two audio signals:

- One signal confirms the start of a dialog sequence and sounds immediately after the user presses the PTT (push-to-talk) button on the steering wheel.

-  A second signal sounds to mark the end of the dialog.

The user also receives visual confirmation via the instrument panel of the voice command result (e.g. after saying the command "New number" a confirmation will appear on the instrument panel display).

0.5 GB of storage space is reserved on the hard disk for the voice recognition system (iSpeech data).

## Workshop Exercise - Car Information Computer

*Work through the following tasks to get familiarized with F01/F02 CIC.*

*Go to Main menu and select Vehicle Info.*
*List the three ways to access the Integrated Vehicle Owner's Manual information under this sub-menu.*

_____

_____

_____

How else is it possible to access the Integrated Vehicle Owner's Manual using the CIC?

_____

_____

*Look up Night Vision in the CIC Integrated Vehicle Owner's Manual using the speller.  Explain the new People Detection feature of the Night Vision system*

_____

_____

*Look up the High Beam Assistant system in the Integrated Vehicle Owner's Manual.*

*Find the animation on the system and play it.*
What preconditions must be set before the animation can be played?

_____

_____

_____

*Look up Lane Departure Warning in the CIC Owner's Manual using the speller.*
Is there an animated explanation for this feature?

_____

_____

_____

Does the Lane Departure warning system warn you if you turn on the indicator prior to changing lanes?

_____

_____

*Look up Active Blind Spot Detection in the CIC Owner's Manual using the speller.*

Is there an animated explantation for this feature?

_____

_____

_____

# Workshop Exercise Navigation

*Task 1*  Which functions can be selected by clicking on the icons in the Navigation toolbar?
Fill in the explanation of the items in the legend provided.

*Task 2*  Use the voice input and activation system to change the Navigation settings for each function listed in the toolbar.

*Task 3*  Fill in the legend in with the commands (settings) you entered for each menu item.

| Index | Explanation | Voice Command |
|-------|-------------|---------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |

## Workshop Exercise - CD/Multimedia

*Using an instructor assigned F01/F02 vehicle, work through the following tasks to get familiarized with F01/F02 CIC then answer the following questions.*

**1)** *Locate the Import/Export USB connector and using a USB stick with music files import them to the car.*

Where is the Import/Export USB connector located?

*Circle the best possible answer.*

| Center console | Glove Box | Ash tray |
|---|---|---|

**2)** *Load a "store bought" audio music CD into the CD/DVD drive of the CIC and rip the music to the CIC memory.*

Is the Audio CD (track, title, artist) recognized by the music search function of the CIC?

*Circle the best possible answer.*

| Yes | No |
|---|---|

**3)** What does the CIC look at to correctly recognize the Audio CD?

*Circle the best possible answer.*

| WMA files | Metadata | Temp. Files |
|---|---|---|

**4)** *Load a "homemade mix" audio music CD into the CD/DVD drive of the CIC and rip the music to the CIC memory.*

Is the Audio CD recognized correctly by the music search software of the CIC?

*Circle the best possible answer.*

| Yes | No |
|---|---|

**5)** *Export (back up) the stored music collection to a USB stick..*

**6)** *Go to a different vehicle and import your backed up music collection into that car. Explain your results below.*

_____

_____

_____

_____

**7)** *Delete your music collection from the CIC hard disk*

**8)** *Restore your music collection from the backed up file stored in the USB stick.*

**9)** Which device is **_NOT_** recommended to be used with Import function of the CIC music collection?

*Circle the best possible answer.*

| 1.1 USB stick | 2.0 USB stick | iPod |
|---|---|---|

## ⚙ Workshop Exercise - USB/Audio Interface

*Using an instructor assigned F01/F02 vehicle, connect a USB external device (MP3 player) to the USB/Audio interface and answer the following questions.*

**1)** *Locate the USB Audio interface in the center console.*

   *Install the external USB/Audio device to the interface as in the illustration below.*



**2)** *Select the CD-multimedia menu and  then external devices.* Is the music stored in the external device accessible through the CIC?   *Select the best possible answer.*

**Yes**                    **No**

**3)** Are the music files recognized and labeled by the system? *Select the best possible answer.*

**Yes**                    **No**

**4)** *Play a song stored  in the external device using the CIC controller.*

**5)** *Unplug the single Audio cable of the Y cable  from the auxillary jack connector. **(NOT the USB plug)***

**6)** What is the single Audio connection of the Y cable used for?

_____

_____

_____

**7)** What is the USB connection of the Y cable used for?

_____

_____

_____

**8)** *Try to import music files from the external device (MP3 Player) into the music collection through the Import/Export USB connection located in the glove compartment.*

**9)** Are the music files recognized and properly labeled by the system?   Explain why or why not below.

_____

_____

_____

## Workshop Exercise - Service Mode

*Using an instructor assigned F01/F02 vehicle, perform the tasks below and answer the following questions.*

*Use the controller of the CIC to enter Service Mode.*

What kind of information is stored in service mode?

What is the navigation version of this vehicle?

What other useful tests can be performed from the Navigation Service menu?

What version of Gracenote does this vehicle have?

What other task can be performed in the Gracenote Service menu?

**Activating the Service Mode**

In the main menu, push the controller forwards and hold there for longer than 10 seconds.

Then proceed as follows:

- Turn the controller 3 stops clockwise
- Turn controller 3 stops anticlockwise
- Turn controller 1 stops clockwise
- Turn controller 1 stops anticlockwise
- Turn controller 1 stops clockwise
- Press the controller; the Service mode is added as the last menu item in the "Settings" menu.

**Note: Push the controller in any direction to return to the main menu.**

*List the steps for resetting the CIC in the space below and note any precautions that apply.*

## Workshop Exercise - Car Information Computer

*Work through the following tasks to get familiarized with F01/F02 CIC then answer the following questions.*

What information can be displayed in the information display located in the instrument panel?

_____

_____

_____

_____

_____

Under which menu can you find and select the information you want to display on the instrument panel information display?

_____

_____

_____

Which settings can be adjusted from the Climate menu?

_____

_____

_____

*Describe the three functions of the FM triple tuner.*

*1* _____

*2* _____

*3* _____

What is important to note about the location of the IBOC in the F01/F02?

_____

_____

How is the long distance AM range enhanced in the F01/F02?

_____

_____

_____

How much disk space does the Voice Activation data occupy in the CIC hard disk drive?

_____

_____

_____

# Rear Entertainment (RSE)

The rear seat entertainment system F01/F02 features several innovations in terms of equipment and operation.

Two folding 800 x 480 pixel displays with an infrared transmitter are fitted for the first time in a BMW vehicle. They are integrated into the backrests of the front seats.

New features of the rear seat entertainment system:

- Rear seat entertainment control unit with DVD player

- Separate AV inputs and headphone connections in the rear center console

- Two 8" rear displays with control units and infrared transmitters built into the backrests of the front seats

- The same program can be viewed on both screens. If an external device (e.g. game console) is connected, the feed from the external device is shown on the selected side.

- The system is controlled by remote control

The RSE control units are integrated in the MOST bus.

The Car Information Computer CIC serves as the master control unit of the MOST-bus.

The rear displays with control units are connected to the K-CAN.

**Rear seat entertainment system**



| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Central information display (CID) | 4 | Remote control |
| 2 | Head unit (CIC) | 5 | RSE MID control unit |
| 3 | Rear-seat display (FD2) | 6 | Rear-seat display (FD) |

**Function diagram of the rear seat entertainment system**
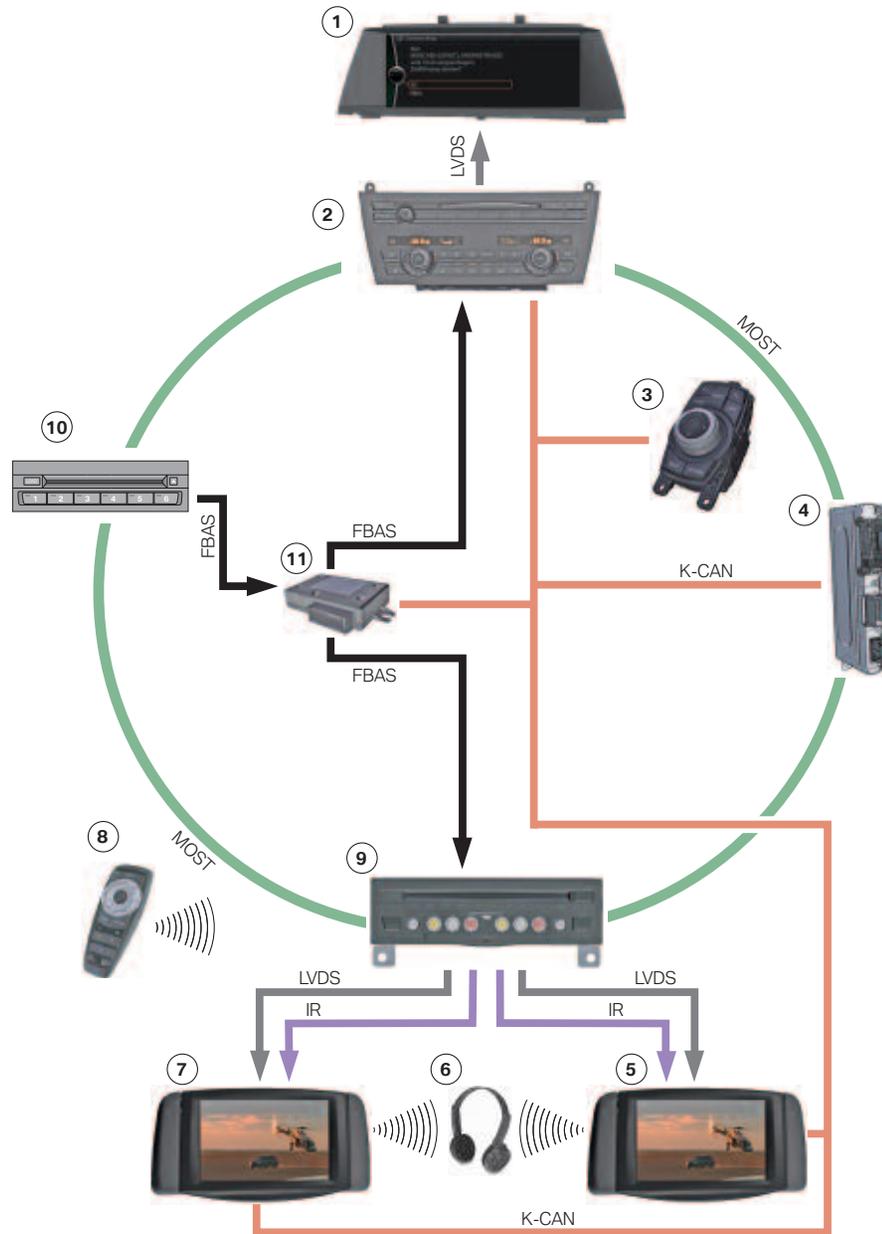


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Central information display (CID) | 7 | Rear display (FD) with rear display control unit and infrared transmitter |
| 2 | Head unit, Car Information Computer (CIC) | 8 | Remote control |
| 3 | iDrive controller | 9 | Rear seat entertainment control unit (RSE) |
| 4 | Central gateway module (ZGM) | 10 | DVD changer (DVD) |
| 5 | Rear display (FD2) with rear display control unit and infrared transmitter | 11 | Video switch (VSW) |

The CIC and the RSE control units receive a FBAS (CVBS) composite video signal input from the DVD changer. The video switch is installed to accommodate this equipment configuration.

The rear displays (FD and FD2) each have their own control unit (SG-FD and SG-FD2). These control units are connected to the K-CAN.

The rear displays are connected via LVDS to the RSE control unit and all video information is transmitted through the LVDS link.

The rear displays are switched on and off by the RSE control unit via MOST > ZGM > KCAN.

The ZGM places the MOST signal on the K-CAN and is sent to the rear displays.

During audio playback through the vehicle's speaker system, the RSE control unit routes the audio signal via the MOST to the head unit CIC or the Top-HiFi amplifier.

**Note: Programming, coding and diagnosis of the rear seat entertainment system is done through the MOST.**

When playing a DVD in the CIC, the picture cannot be transmitted to the rear seat entertainment system. When playing a DVD in the RSE control unit the picture is not transmitted to the CIC. Audio playback, however, is possible in both cases.

During playback through the DVD changer, picture and sound are transmitted to the CIC and the rear seat entertainment system.

External devices can be connected through the two AV inputs directly to the RSE control unit, through the AUX-In connection or the USB-audio interface in the center console.

When an external device (e.g. game console) is connected through the AV inputs, the video signal is output on the left or right display depending on to where it is connected. Both screens can be set up to display the external source or the side not connected to the external device may be set up to play a different choice of media (DVD, radio, music collection).

**Note: Once an external device (e.g. game console) is con-nected to one of the AV inputs it remains active until it is powered down or disconnected.**

## Headphones

If audio is played back through the headphones, the volume can be adjusted either on the headphones (infrared headphones) or using the remote control (hard-wired headphones).

The RSE control unit sends the audio signal to the rear displays. The infrared headphones receive their signals from the infrared transmitter. The infrared headphone frequencies are listed on the following chart.

| Left channel | Right channel |
|---|---|
| 2.3 MHz | 3.2 MHz |
| 2.8 MHz | 3.8 MHz |

## RSE Remote Control

The sound settings can be configured on the CIC or with the remote control.

The remote control signal path is the same as that for the remote control services. The remote control operates on a frequency of 315 MHz and must be taught in (programmed) to the specific vehicle to operate.

**Rear entertainment remote control**



| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Menu | 7 | Volume |
| 2 | Thumbwheel | 8 | Track search/track skip |
| 3 | Confirmation button | 9 | Wireless symbol |
| 4 | Option | 10 | Back |
| 5 | Battery symbol | 11 | Four-way directional controller (four buttons) |
| 6 | Selector slide, left/right | | |

## Service Information

### Diagnosis RSE

The BMW diagnostic system contains the diagnostics for the rear seat entertainment systems under "Rear seat entertainment".

The RSE and the two rear displays are defined as the control units.

Fault code memory checks, testing schedules and test modules are available for following components:

- Rear seat entertainment control unit
- Rear displays
- Remote control

Component activation is also possible for the control units:

- General:
  - Reset of RSE control unit
- Display
  - Test card, test of video inputs and video outputs
- Audio
  - Sine generator (test noise)
- Drive
  - DVD emergency eject

### Programming the Remote Control

There is a Service Function for programming the remote control in the diagnostics under Rear Seat Entertainment.

The testing schedule works through the following steps:

- The entry of the currently assigned remote control for the rear seat entertainment system is deleted in CAS 4.
- The remote control for the rear seat entertainment system is programmed.
- Successful programming of the remote control is is verified by automatic closing and opening of the central locking.

It is not possible to exchange the remote control. Only the programmed remote control will be functional in the vehicle.

## Classroom Exercise - Bus Structure Changes on the F01/F02 Entertainment System

*Find and fill in the missing control units in the F01/F02 bus chart legend*
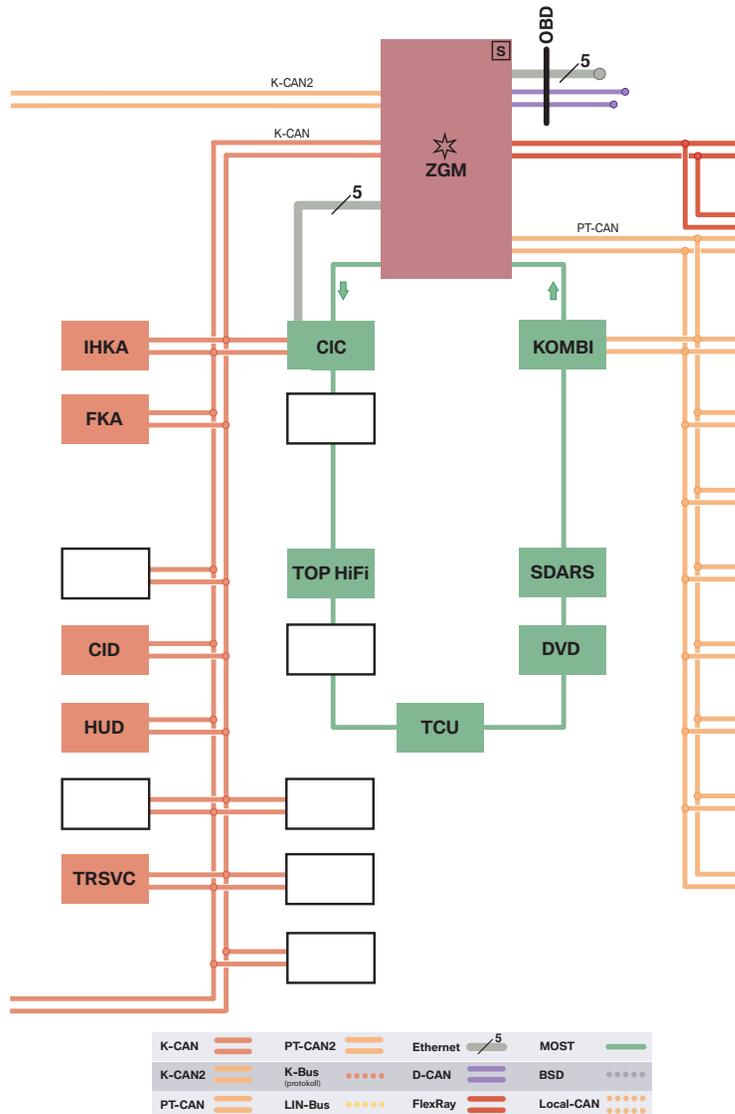


| Index | Explanation |
|---|---|
| CIC | Car Information Computer |
| CID | Central Information Display |
|  |  |
| DVD | DVD changer |
|  |  |
|  |  |
| FKA | Rear compatrtment heating/air conditioning |
|  |  |
| HUD | Head-up Display |
| IHKA | Automatic climate control |
| KOMBI | Instrument cluster |
| OBD | Diagnosis socket |
|  |  |
| SDARS | Satellite tuner |
| TCU | Telematics Control Unit |
| TOP HIFI | Top-HiFi system |
| TRSVC | Top Rear Side View Camera Module for rear/side view cam |
|  |  |
|  |  |
| ZGM | Central Gateway Module |

*Using the vehicle and or the appropriate location legend, find the following control units and connections and note down their locations below.*
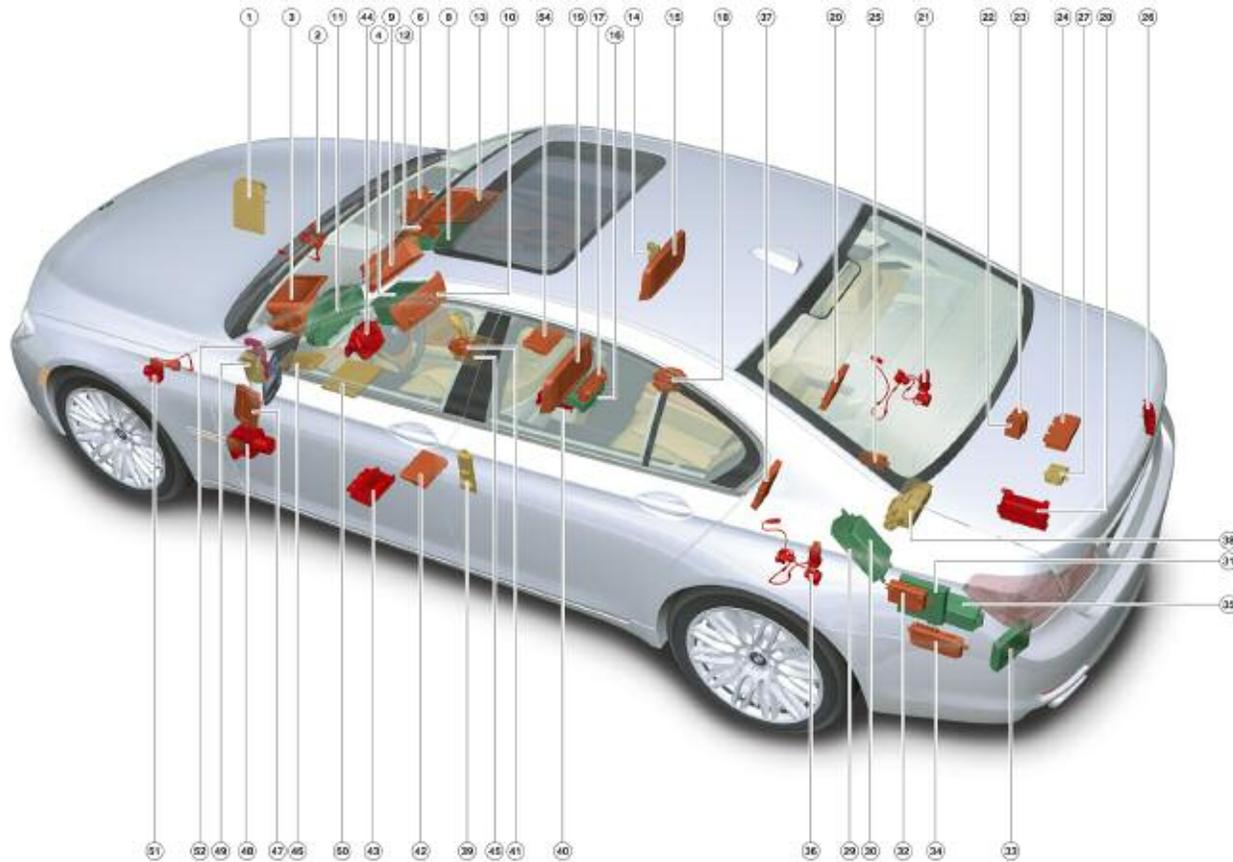


| Control unit or Connection | Installation location | Control unit or Connection | Installation location |
|---|---|---|---|
| **TOP_HiFi** | | **import/export USB connection** | |
| **Video Switch** | | **AUX-IN/USB audio interface** | |
| **DVD Changer** | | **TCU** | |
| **RSE** | | **ULF-SBX-H** | |
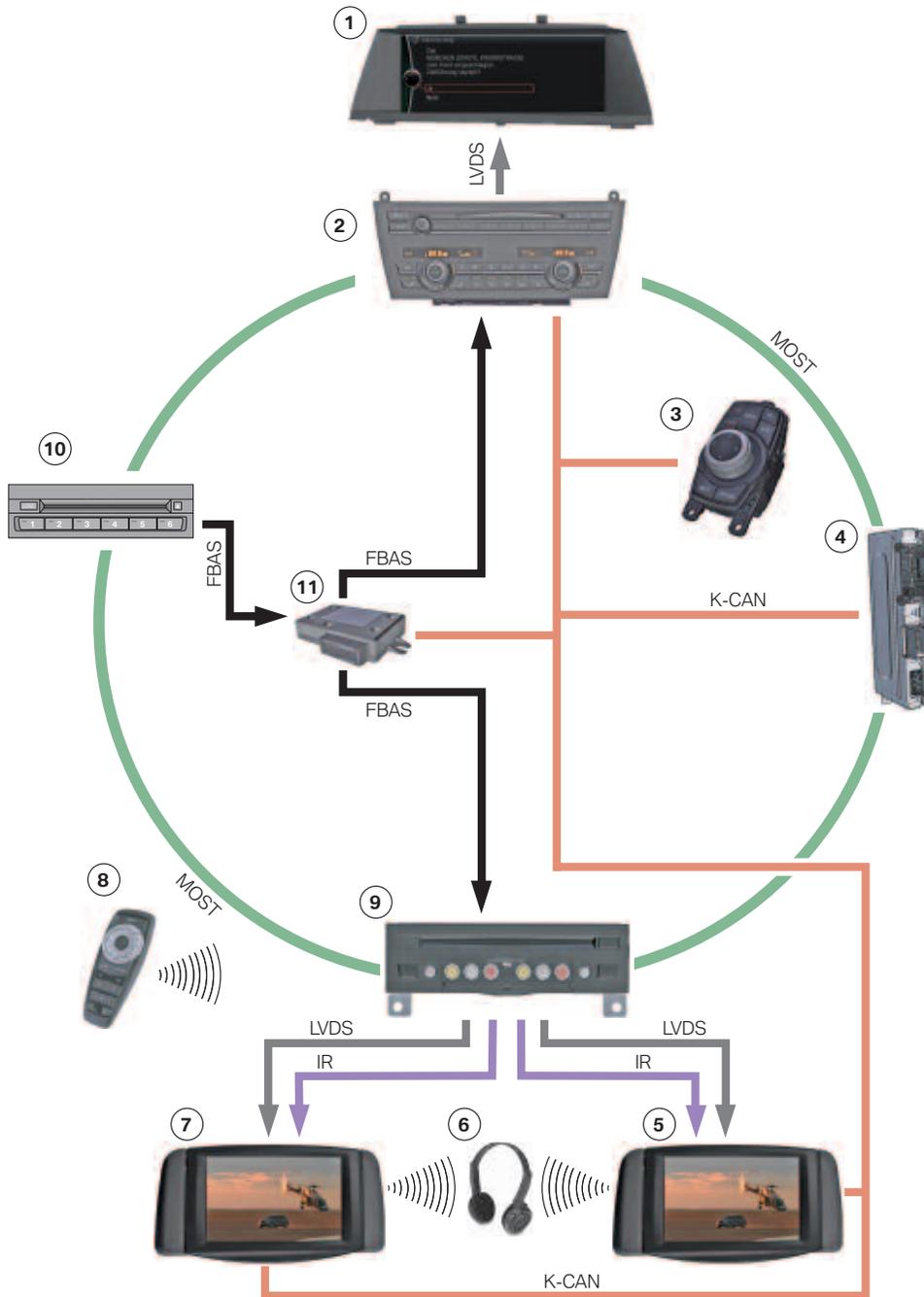
*Insert and play media in the different devices and note on the chart below where they can be viewed.*

| Input Source | CID | FD | FD2 |
|---|---|---|---|
| Play from Music Collection | | | |
| Play audio CD from CIC - CD/DVD | | | |
| Play video from CIC - CD/DVD | | | |
| Play from DVD Changer | | | |
| Play from USB/Audio Interface | | | |
| Play from Rear Entertainment | | | |
| Play from External AV RSE input | | | |

What type of media can be played in which device?

*Fill in the chart below.*

| Type of Media Supported | CIC | DVD | RSE |
|---|---|---|---|
| Audio CD-A | | | |
| JPG | | | |
| Audio MP3 | | | |
| Audio AAC/M4A | | | |
| Audio WMA | | | |
| Audio AAC/M4P | | | |
| Video DVD | | | |
| Video AVI | | | |
| Video Divx | | | |
| Video MP4 (MPEG-4 movie) | | | |

*When checking the DVD Changer practice the quick load procedure.*

## Workshop Exercise - Rear Seat Entertainment

*Perform the following tasks on the Rear Entertainment System then answer the following questions.*

*Use wiring diagrams in ISTA and bus information to locate the bus signal pathway for the audio signal from the DVD Changer to the wireless headphones.*

> **DVD Changer** > > > **Wireless Headphone**

*The customer complains that the right wireless headphone does not work.*
Where could the problem be?

_____

_____

*Find the Volume Settings in the rear entertainment system using the remote control.*

Which volume settings can we adjust from there?

_____

_____

Does the Remote Control for the entertainment system need to be initialized?

_____

_____

*Teach in (program) the remote control of the rear seat entertainment with the aid of the ISTA BMW diagnostic system. Note the steps of the procedure below.*

_____

_____

_____

*Insert an audio CD into the DVD drive of the RSE . Playback the audio through the in-car speakers , the infrared headphones and then the hard-wired headphones.*

*Answer the following True or False questions regarding the procedure.*

1) The speaker control must be switched on to facilitate audio playback through the in-car speakers.

   | True |    | False |

2) The hard-wired headphones are muted when speaker control is activated.

   | True |    | False |

3) The "Headphones" option has to be selected again in the CID in order to switch audio output back to the hard-wired headphones.

   | True |    | False |

# Classroom Exercise - Rear Entertainment (RSE)

*Please answer the following questions regarding the RSE system.*
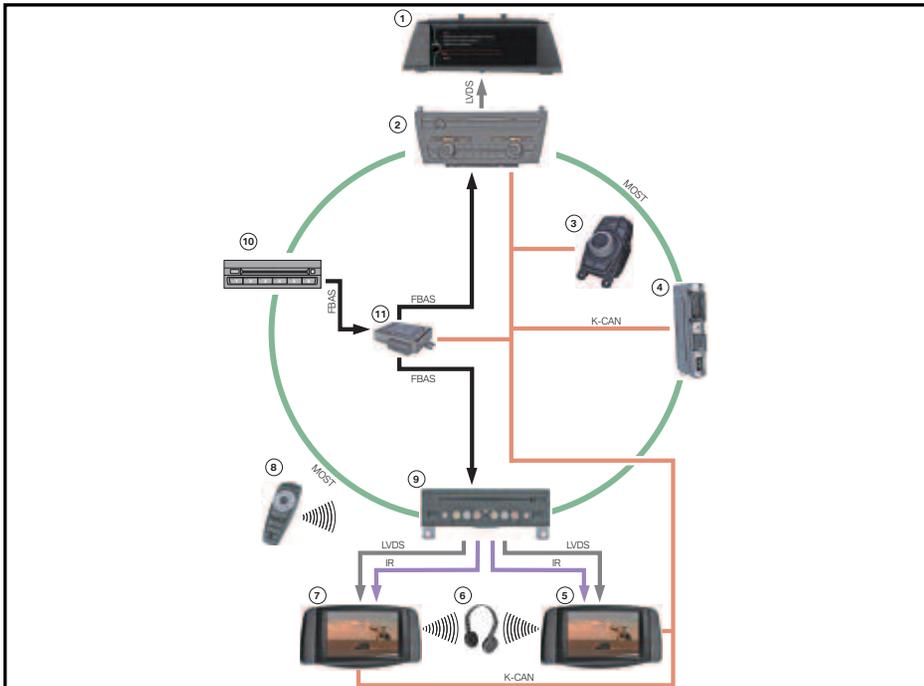


**1)** What is the component #11?

*Circle the best possible answer.*

| Video switch | USB Hub | Video Module |

**2)** Component #11 is needed to connect which of the following?

*Circle the best possible answer.*

| Video Switch | DVD Changer | CD/DVD |

**4)** What is the purpose of the FBAS signal?

_____

_____

_____

**5)** What is the signal pathway to turn On and Off the RSE rear displays?

_____

_____

_____

**6)** Programming and coding of the RSE is done through the _____.

*Circle the best possible answer.*

| MOST | MOST Connector | K Can |

**7)** What is the IR signal line in the graphic used for?

*Circle the best possible answer.*

| Video Signal | Headphone Audio | FBAS |

# Displays, Indicators and Controls

As in all other BMW models, the operating and control concept of the new BMW 7 Series F01/F02 is based on clear and optimum structuring of the cockpit. Fewer switches simplify logical operation. The display, indicator and control elements are organized in a hierarchical arrangement corresponding to their function.

## Display, Operating and Control Concept

With the new BMW 7 Series F01/F02, a new operating and control concept is being introduced at BMW.

In addition to the main menu, there is an arrangement of four direct access buttons, a Back button and an Option button in the immediate vicinity of the controller.

**Display, operating and control concept BMW 7 Series F01/F02**

| Index | Explanation |
|-------|-------------|
| 1 | Head-up display (HUD) |
| 2 | Instrument cluster |
| 3 | Central Information Display (CID) |
| 4 | Favorites buttons for individual assignment |
| 5 | Controller |
| 6 | Gear selector switch (GWS) |
| 7 | Steering column stalk/steering wheel |
| 8 | Operating unit for driver assistance systems (BEFAS) |

## Instrument Cluster

The instrument cluster is a new development. It has four analog needle instruments based on full-surface Black Panel technology.

With this display technology, the symbols of the individual functions only become visible when the ignition is switched on.

At first glance, the instrument cluster appears as a black surface, without an arrangement of digits and different-colored function symbols.

The two large dials show the road speed and engine speed.

The two small dials indicate the fuel level on the left-hand side and the oil temperature on the right-hand side.

Most of the indicator lamps arranged are in the center, at the top between the two large dials and above the two small dials.

A permanent background image in orange gives the instrument cluster a certain 3D representation.

The TFT display is located in the lower part of the instrument cluster, in the center between the two small dials.

The display for the Entertainment mode is located on the right-hand side of the display; the Navigation display is in the center; and the display for Check Control messages is on the left.

# Central Information Display CID

The Central Information Display, CID, is a further development of the CID already used in BMW models.

The new BMW 7 Series F01/F02 features very similar software as used in the CID installed in the BMW 3 Series with a CIC.

As on all new BMW models, the system is operated by means of the central control element, the controller.

The is an operating unit for the following functions:

- CD/Multimedia
- Radio
- Telephone
- Navigation
- Contacts
- BMW Assist
- Vehicle Info (Owner's Manual)
- Settings



**Central Information Display (CID)**

## Personal Profile

The "Personal Profile" systems allows the driver to set several functions in the BMW 7 Series F01/F02 to suit his/her personal requirements.

Personal Profile stores the data entered by the driver such as automatic setting of the outside mirrors or speed-dependent volume in the corresponding control units.

As soon as the vehicle is unlocked using the identification transmitter, the system recognizes the corresponding settings belonging to the identification transmitter.

Up to three different basic settings can be adapted for three different persons. The precondition is that each of the three persons has his/her own identification transmitter.

# Controls on the Steering Wheel

There are blocks of buttons in the steering wheel on the left and right.

The controls for the cruise control function are located on the left-hand side of the steering wheel.

The controls for operation of the radio and telephone functions are on the right.

**Controls on the steering wheel**

| Index | Explanation |
|-------|-------------|
| 1 | Set button, Save speed |
| 2 | Reduce distance button |
| 3 | Toggle switch + - Change speed |
| 4 | Increase distance button |
| 5 | Enable / disable, interrupt DCC/ACC |
| 6 | Resume / call-up stored speed button |
| 7 | Knurled wheel Select radio station |
| 8 | MODE button Switch audio sources |
| 9 | Toggle switch + Change volume |
| 10 | Toggle switch - Change volume |
| 11 | Hands-free button |
| 12 | Telephone button |

# Controller

The operating and control concept of the controller on the F01/F02 has been extended to include a number of toggle switches that can be a great advantage for menu guidance.

In addition to a possibility to open the main menu in the CID, an arrangement of toggle switches for the most important menu items in the main menu is located in the immediate vicinity of the controller.



**Center console on BMW 7 Series F01/F02**

| Index | Explanation |
|-------|-------------|
| 1 | CD toggle switch |
| 2 | Main Menu toggle switch |
| 3 | Telephone toggle switch |
| 4 | Navigation toggle switch |
| 5 | Controller |
| 6 | Radio toggle switch |
| 7 | Option toggle switch |
| 8 | Back toggle switch |
| 9 | Parking brake, automatic |
| 10 | PDC button |
| 11 | Side View button |
| 12 | Parking brake, electrical |
| 13 | Driving dynamics switch, DSC button |
| 14 | Gear selector lever |

# System Overview

The system circuit diagram for the outside temperature is displayed to the right.

The diagram is structured in such a way that only the control units and control elements directly involved in the instrument cluster are shown.

The instrument cluster receives a large number of different bus signals that provide information (speed, CC messages, etc.) for the various displays and indicators. These bus signals are requests to the instrument cluster and are therefore not listed in this product information.

The only directly connected component that can be seen in the system circuit diagram is the outdoor temperature sensor.

This input signal is read directly in the instrument cluster and made available from here to all other bus users. The outdoor temperature sensor wiring "passes through" the junction box and is processed directly by the instrument cluster.

**System circuit diagram for outside temperature**
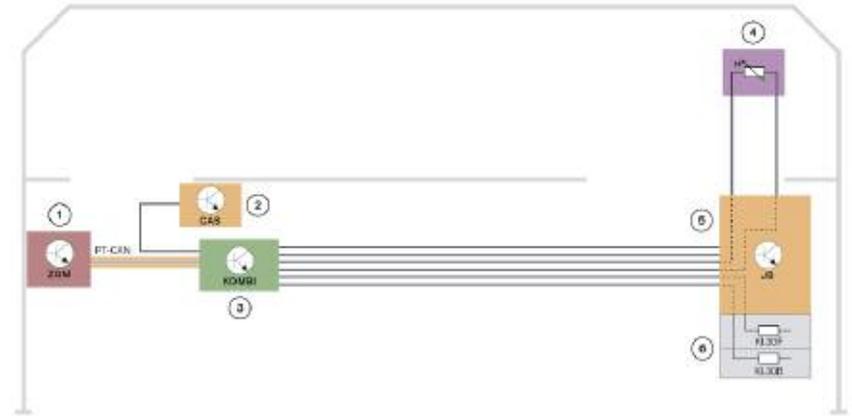


| Index | Explanation |
|-------|-------------|
| 1 | Central Gateway Module (ZGM) |
| 2 | Car Access System (CAS) |
| 3 | Instrument Cluster |
| 4 | Outside Temperature Sensor |
| 5 | Junction Box |
| 6 | Front Distribution Box |

# Principles of Operation

## Instrument Cluster

The instrument cluster receives information on the wiring harness in the form of analog and digital electrical signals. These signals are processed and displayed in the instrument cluster or passed on as information to other control units.

On the new BMW 7 Series F01/F02, the instrument cluster has a number of functions that are new to BMW or have changed in relation to existing BMW models.

### ■ Black Panel Technology

The F01/F02 is the first BMW vehicle to utilize Black Panel technology. This is a panel, the back of which is coated with black film that virtually covers the entire surface portion of the instrument cluster.

Black Panel technology is used on the instrument cluster, control panels for IHKA/AUDIO and FKA.

On the instrument cluster, the area that is not covered by the Black Panel is designed in such a way that the symbols of the lamps are not visible when switched off.

The Black Panel surface appears homogeneously dark, which means that no details from the background area can be detected.

The two large accentuating rings for the speedometer and tachometer and two small dial areas for the fuel gauge and oil temperature are galvanized.

### ■ Instrument Cluster - Off

When the instrument cluster is switched off, the analog indicators are at their zero point, the active area of the display is switched off and the rings in the display area are not closed.



### ■ Instrument Cluster - Vehicle Awake

When the vehicle is awake, the analog indicators are at their zero point, the active area of the display is switched on only to complete the lower portion of the rings in the display area.

## ■ TFT Display

A horizontal TFT display with a resolution of 960 x 160 pixels is integrated in the instrument cluster underneath the dials.

The large mechanical, analog dials are open at the bottom. These dials are closed by graphics. The graphics are displayed digitally and contain specific functional indicators such as the range or current consumption.

The display enables the prioritization of information with the following representations:

- under right dial - display of audio and telephone lists that can be operated via the multifunction display, MFL

- under left dial - display of longer, two-line Check Control texts

- center display area - the navigation information, including other navigation texts under the left-hand and right-hand dial.

This structure of the instrument cluster enables flexible use of the display area and keeps the signature BMW appearance for the large dials for road speed and engine speed.

The most important information that appears depending on the content and prioritization is:

- Navigation display

- Infotainment (audio and telephone)

- Voice input acknowledgement

- Check Control messages

- Traffic information

- Operation acknowledgements from driver assistance systems.

The background image is activated in orange and is always displayed as soon as anything appears in the display.

## ■ Schematic Breakdown of the Display Area

The graphic in the next page shows the schematic breakdown of the display area in the instrument cluster. Nighttime design is activated in the display when the parking lights or headlights are on.

## ■ Daytime–nighttime Design

The daytime-nighttime design differs with regard to the color assignment of some text and graphic elements.



**Nighttime design**

**Daytime design**

The following displays change from white to orange:

- Scales and scale lettering of the large and small dials

- Basic indicators, e.g. time, outside temperature

- Gear indicators

- On-board computer and navigation displays

- CC texts and texts for operation acknowledgements

- Text and line for rear seat belt status

**Note:** **The texts in the CBS reset menu and the test functions are always in white, independently of the daytime / nighttime view.**

**Schematic breakdown of the display area**



| Index | Explanation | Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|-------|-------------|
| 1 | Two-color flush-mounted pointer | 5 | Entertainment lists<br>FDS menu<br>Navigation "Coming Road" | 9 | Check Control (symbol)<br>Traffic information (symbols) |
| 2 | FAS status indicator<br>FAS information<br>FAS warnings | 6 | Navigation (junction view)<br>Lane Guiding<br>Condition Based Service<br>Test menu | 10 | Reset button<br>Trip distance recorder |
| 3 | Rear seat belt status<br>Entertainment (symbols)<br>Communication (symbols)<br>PTT acknowledgement (symbols) | 7 | Check Control messages<br>Operation acknowledgements<br>Traffic information<br>Navigation (Distance to Junction) | | |
| 4 | Fuel consumption indicator (analog)<br>Gearbox position<br>Manual gear indicator<br>Shift recommendation<br>Display FDS menu<br>Automatic engine start-stop function | 8 | Range (analog and digital)<br>On-board computer<br>Operation acknowledgements (symbols)<br>Speed Limit Info | | |

## On-board Computer

On-board computer function in the instrument cluster.

The on-board computer functions can be called up by briefly pressing the on-board computer button on the
steering column stalk.

Pressing the on-board computer button again displays
information in the following order:

- Range

- Average fuel consumption

- Average speed

- Distance (Nav destination entered)

- Estimated time of arrival (Nav destination entered)

- Date

**Steering column stalk**

| Index | Explanation |
|---|---|
| 1 | On-board Computer Button |
| 2 | High Beam Assistance Button |
| 3 | Left Stalk switch |

| Index | Explanation |
|---|---|
| 1 | Range:<br>If the value displayed for the range is greater than the highest value on the scale, the analog indicator is on the right-hand edge of the scale. The digital indicator shows the current value. |
| 2 | Average fuel consumption:<br>The display is a maximum of 2 digits plus one decimal place in US mpg. |
| 3 | Average speed:<br>The display is a maximum of 3 digits plus one decimal place in US mph. |
| 4 | Distance (Nav destination entered):<br>In addition to the 4-digit display of the digital distance value, the distance to the destination is shown in the analog range display as a dot. Distances are always shown without decimal places. |
| 5 | Estimated time of arrival ( Nav destination entered):<br>In addition to the display of the estimated time of arrival, the distance to the destination is shown in the analog range display as a dot. |
| 6 | Date:<br>The date is always shown with a leading "0" and with the last two numbers of the year. |
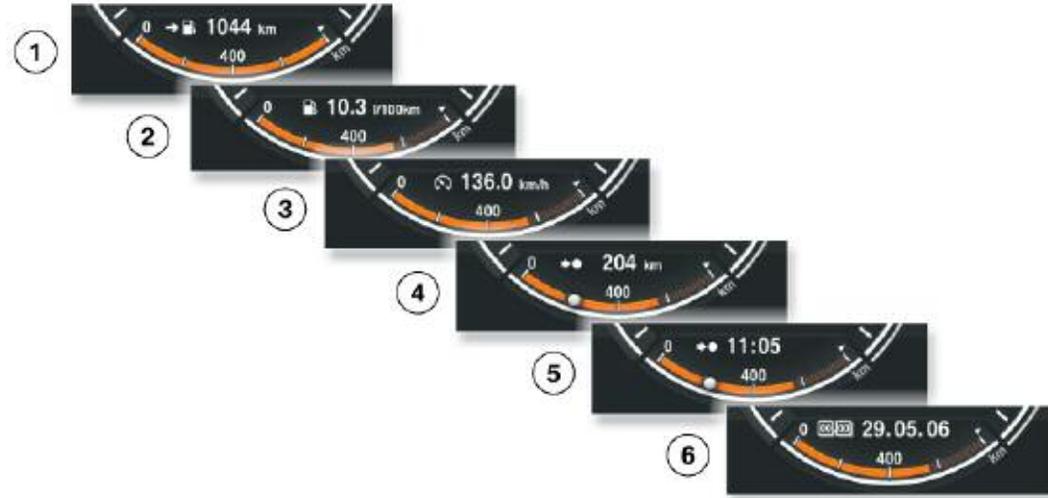
# Service Information

## Instrument Cluster Test Functions

The test functions are shown in the TFT display of the instrument cluster.

### ■ To Start Function Test
- Terminal R ON or terminal 15 ON.

- Press and hold the reset button in the instrument cluster for 10 seconds (set/reset).

or

- by holding down the setting button in the instrument cluster and simultaneously switching on terminal R.

### ■ Display of Test Functions
The test functions appear in the center of the TFT display, between the two dials.

Only tests one through four are unlocked. All other test functions are unlocked by entering the sum of the digits in the vehicle identification number while in test function 4.

### ■ To End Test Function
- Ignition key at terminal R or terminal 15 ON.

- Press and hold the reset button for longer than 10 seconds.

The main menu appears in the instrument cluster

- Press the reset button repeatedly until "Test End" is highlighted and then hold down the reset button until the words "Test End?" appear or

- call up test function 19 (RESET).

## ■ Overview of Test Functions
Only the main test functions are listed in the following table.
In addition to the majority of test functions, there are further equivalent functions for which a similar display appears in the instrument cluster.

| Index | Explanation |
|-------|-------------|
| 1 | Identification |
| 2 | System test |
| 3 | Test End |
| 4 | Unlock test functions |
| 5 | Current consumption |
| 6 | Range consumption |
| 7 | Fuel gauge values |
| 8 | Coolant temperature, outside temperature |
| 9 | On-board computer average values |
| 10 | Speedometer / revolution counter |
| 11 | Display of operating voltage |
| 12 | Trigger acoustic signals |
| 13 | Read fault codes |
| 14 | Dim LCD |
| 15 | Dim / PWM signal |
| 16 | Condition Based Service |
| 17 | Check Control |
| 18 | Correction factor for consumption values |
| 19 | Software reset / RAM reload |

◼ **Component Replacement**

There are three possible combinations for replacing the instrument clusters and Car Access System 4, CAS 4.

- Instrument cluster defective, CAS 4 OK

- CAS 4 defective, instrument cluster OK

- CAS 4 and instrument cluster must be replaced.

Simultaneous replacement of CAS 4 and the instrument cluster should be avoided. The odometer reading will be lost as a result.

It is not recommended to "try" an instrument cluster from another vehicle.

◼ **Removal of the Instrument Cluster**

The instrument cluster is held in place by two clips on the upper section of the bezel. The two torx screws as in previous model vehicles have been eliminated.

## Workshop Exercise - Instrument Cluster

*Using an instructor assigned vehicle, perform the tasks outlined below.*

**1)** Remove the instrument cluster.

*Which tools if any were needed to perform this function?*

_____

_____

_____

**2)** Which module/method can be used to reset the CBS data for oil service?

*Check on the correct answer and describe the process or path to be followed to complete this task.*

❑ Instrument Cluster

_____

_____

❑ CID

_____

_____

❑ ISTA

_____

_____

❑ GT1

_____

_____

**3)** Perform an instrument cluster self test and list the procedure below.

_____

_____

_____

**4)** *Please enter the appropriate test function number next to the description given.*

_____ Identification

_____ System Test

_____ Fuel Gauge Values

_____ Operating Voltage

_____ Trigger acoustic Signals

NOTES PAGE

# Personal Profile

Personal Profile stores the data entered by the driver - such as automatic setting of the outside mirrors or radio presets in the corresponding control units.

The personal vehicle settings are stored in the ID transmitter and can be called up again at any time.

The individual settings in the vehicle are stored automatically when the user leaves the vehicle. As soon as the vehicle is unlocked using the identification transmitter, the system recognizes the corresponding settings belonging to that transmitter. Up to three different basic settings can be adapted for three different identification transmitter.

On the BMW 7 Series F01/F02, the personal profile system has been extended to include more functions that can be adjusted to suit the personal requirements of the driver.

## New Features

The "Personal Profile" system can be used to store different vehicle settings on the ID transmitter and call them up as required. These profiles can be named/identified by the customer and transferred across a USB interface in the glove box to an external USB storage device to another vehicle that is also equipped with "Mobile Profile".

In previous vehicle models, personal profile was limited to the transmitter currently binge used. As of deployment of the new BMW 7 Series F01/F02, the current user can select which profile they desire by selecting it from the profiles menu in the CID even if the other transmitter is not present.

## Function Groups

The customer can select personalization from the following function groups:

- FM/AM tuner
- Audio
- Navigation
- Favorite buttons
- Seat, mirror, steering column
- Camera settings (Side, Rear, NVE)
- Light/central locking system
- Head-up display
- Climate
- Language/units
- Last mode of driver assistance systems
- Individualization of the driving dynamics switch
- Address book.

**Note: For safety reasons, care should be taken into account when changing the Profile settings from one user to another. During this "changeover" process, the steering wheel and seats may move. For this reason, changing profiles cannot be performed when the engine is running.**

## Personal Profile System Overview
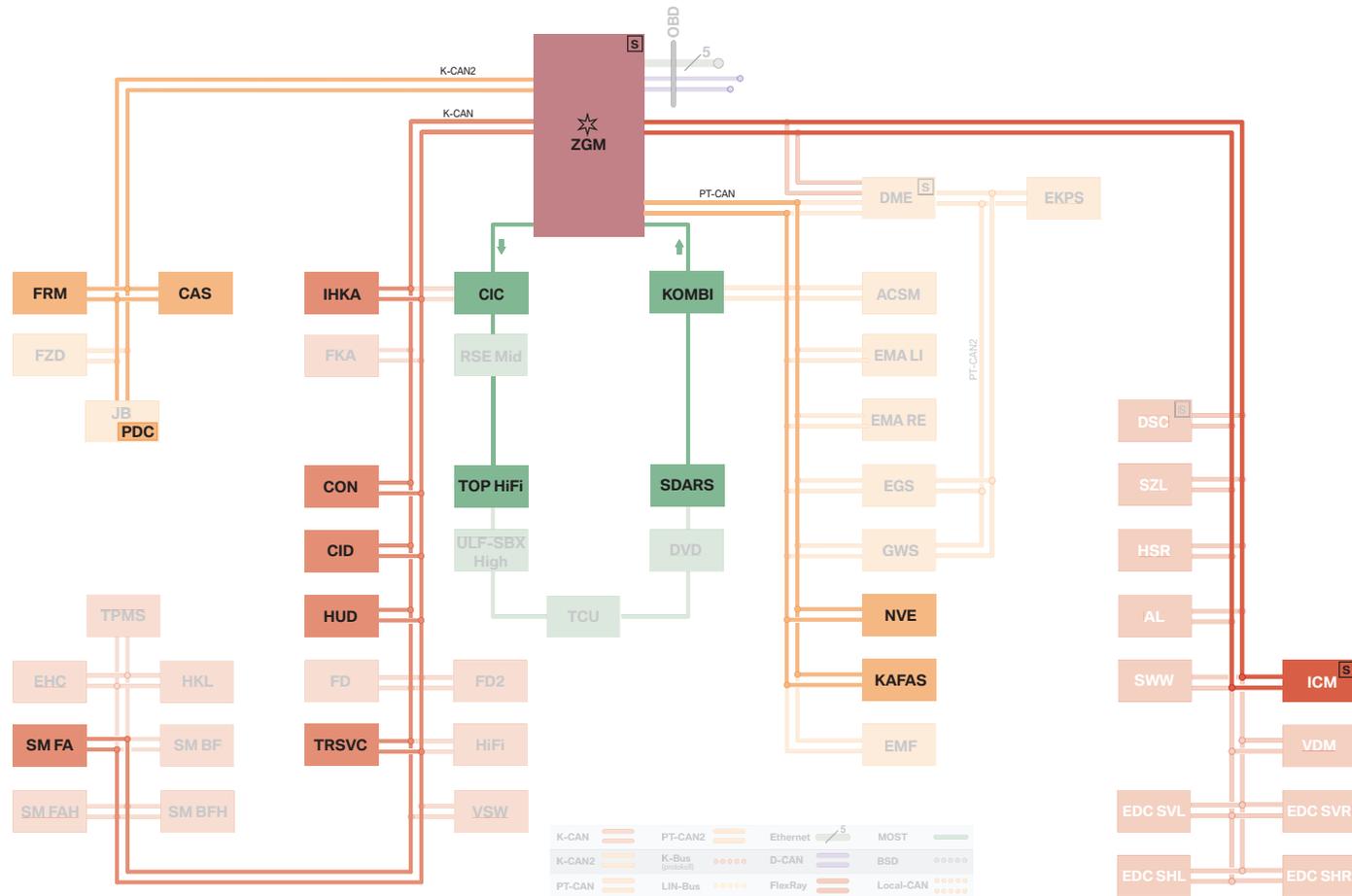


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| CAS | Car Access System | KOMBI | Instrument cluster |
| CIC | Car Information Computer | NVE | Night Vision |
| CID | Central Information Display | PDC | Park Distance Control (in the junction box) |
| CON | Controller | SDARS | Satellite Digital Audio Radio Service |
| FRM | Footwell Module | SM FA | Seat module on driver's side |
| HUD | Head-up Display | Top-HiFi | Top-HiFi amplifier |
| ICM | Integrated Chassis Management | TRSVC | Camera Module |
| IHKA | Automatic climate control | ZGM | Central Gateway Module |
| KAFAS | Camera-based driver assistance systems | | |

## Calling up Profiles

Independently of the ID transmitter used, another profile can be called up or changed via the CID.

The "Profiles" menu is called up as follows:

- Open the main menu by pressing the Menu button on the controller
- Turn the controller until the "Settings" is highlighted, then press to activate.



- Select the option "Profile" from the menu.



- Highlight the desired profile to be applied to the vehicle.



## "Profile" Menu

The following functions can be found in the "Profile" main menu and options menu:

- Import Profile
- Export Profile
- Rename Profile
- Reset Current Profile
- Change Current Profile



**Profile - Main menu**
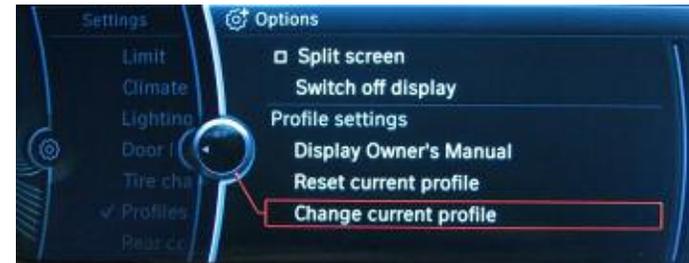


**Profile - Options sub-menu**

# Condition Based Service CBS 5

In the same way as all newer BMW models, the BMW 7 Series F01/F02 provides condition-oriented and requirement-oriented service, Condition Based Service (CBS 5).

The CBS system indicates the wear-related maintenance work to the customer in a clearly arranged and plannable form.

The CBS function shows the next due service in the instrument cluster. In the CID, on the other hand, all the external and internal variables are provided in an additional list.

The CBS sorts all the services/tasks according to the due dates. The customer can determine the appointments and due dates of service in that a car symbol appears in a colored frame and the remaining distance or remaining time to the next service is displayed.

The instrument cluster has a central gateway function in the CBS system. This implements, for example, the sorting of all services or tasks in the instrument cluster.

The instrument cluster calculates the following services or tasks:

- Vehicle inspection
- Vehicle check
- Brake fluid
- Run-in inspection.

The services or tasks for engine oil and front/rear brake pads are calculated by external control units and only forwarded for display on the instrument cluster.

## CBS Indicators in the Instrument Cluster

The CBS display always consists of the following two separate indicators:

- A car symbol in the Center of the TFT display
- A specified remaining distance and/or a specified absolute time immediately below the car symbol.

In the display, a distinction is made between the following two CBS states:

- Service due yellow-framed car symbol.
- Service due since red-framed car symbol.

**Condition Based Service CBS 5**



| Index | Explanation |
|-------|-------------|
| 1 | Car symbol |
| 2 | Remaining distance indicator and/or specified absolute time |

**Note: If a Check Control message appears at the same time as the CBS indicator, the Check Control message is shown after the Service Interval Display.**

# Condition Based Service System Overview
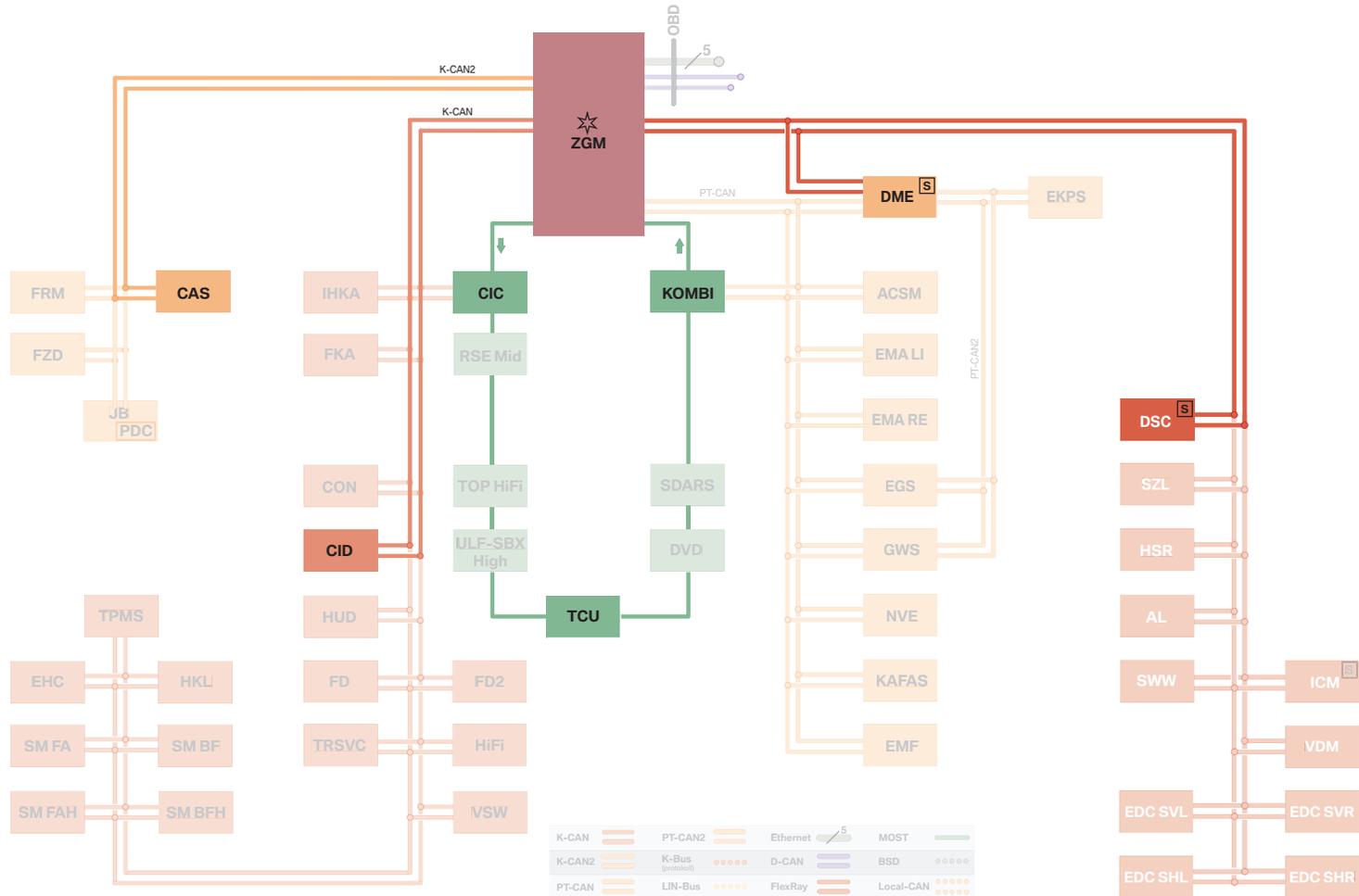


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| CAS | Car Access System | DSC | Dynamic Stability Control |
| CIC | Car Information Computer | KOMBI | Instrument Cluster |
| CID | Central Information Display | TCU | Telematics Control Unit |
| DME | Digital Motor Electronics | ZGM | Central Gateway Module |

**CBS Symbols**

| Normal condition | Service due | Service overdue | Meaning | Explanation |
|---|---|---|---|---|
| | | | Engine oil | Standard |
| | | | Front brakes | Standard |
| | | | Rear brakes | Standard |
| | | | Brake fluid | Standard |
| | | | Pre-delivery check | Only for new vehicles. Not visible to the customer. |
| | | | Vehicle check | Standard |
| | | | Main official inspection (MOT) | Depending on national legislation |
| | | | Exhaust-gas test | Depending on national legislation |

## Indicators in the Central Information Display

All information on the individual service tasks can be displayed in the CID under the menu item "Vehicle Info". The CBS menu is called up as follows:

- Open the main menu by pressing the Menu button on the controller

- Select Vehicles Info from the main menu.



- Turn the controller until "Vehicle Status" is highlighted, then press to activate.
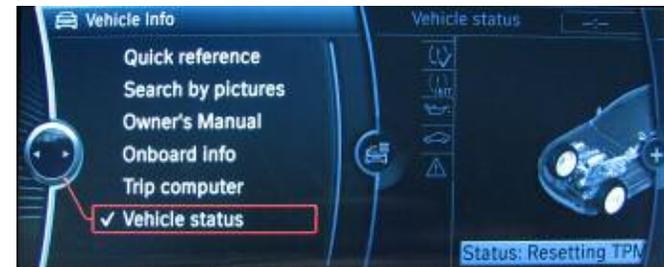


- Turn the controller until "Service Requirements" is highlighted, then press to activate the CBS menu.
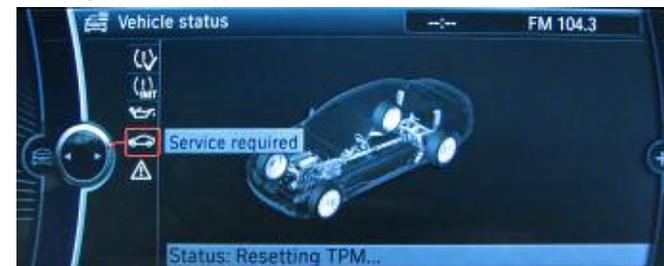
The CBS menu normally consists of the following six menu items:

- Engine oil
- Front brake pads
- Rear brake pads
- Brake fluid
- Vehicle check
- §Vehicle inspection.



**CBS 5 menu**

## Service Information

### Resetting the Service Tasks

If one or more service tasks have been carried out, for example "Replace front brake pads", these services/tasks must be reset to their full service interval.

There are two possibilities to resetting the service tasks in the car:

1. Legal service tasks such as a vehicle safety or emissions inspection can only be reset in the "Vehicle status" menu.

2. All maintenance-related service tasks such as replacing engine oil, are reset using the reset button for the trip/distance recorder in the instrument cluster.

**Note: A connection to the BMW diagnosis system is required for the CBS task "Predelivery check".**

The Reset menu is called up as follows:

- Press the reset button for longer than five seconds; the Reset menu is displayed. The CBS symbol, for example "Pre-delivery check", is displayed in the TFT display between the two dials.

- Briefly press the Reset button to browse in the Reset menu.

- To activate the selected service task, press the Reset button for a longer period; the wording changes to "Run Reset" and a progress bar starts.

- Reset is completed as soon as the lettering "Reset successful" appears.

**Note: If availability has not yet fallen below 90%, no reset can be carried out. A reset block is shown in the TFT display: "Reset not possible".**

### ■ Important Information on Resetting the Service Tasks

On CBS 5 or higher, the CBS function "Vehicle check" is linked to the date of the engine oil interval. The aim of this link is to ensure that a vehicle check is carried out with every second engine oil change.

At the start of the first oil interval with the CBS function "Vehicle check", the customer sees double the remaining distance and double the time interval of the CBS function "Engine oil". After the oil change, both services/tasks run synchronously, i.e. "Engine oil" and "Vehicle check" are carried out simultaneously.

The CBS function "Vehicle check" contains the input information from the CBS function "Engine oil", which is why the service interval "Engine oil" must always be reset before the service interval "Vehicle check".

**Note: Before resetting CBS functions, check the onboard date and correct it if necessary. The control units use the current date and a time interval stored in the control unit to calculate the new target date.**

## ■ Setting Inspection Date

The appointment for vehicle inspections can only be entered in the Central Information Display CID using the controller.

As there is different legislation depending on the state, different intervals or complete elimination of the item in the menu can be achieved.

The following operations are required to enter appointments:

- Open the main menu by pressing the Menu button on the controller .

- Turn the controller until "Vehicle Info" is highlighted, then press to activate.

- Turn the controller until "Vehicle Status" is highlighted, then press to activate.

- Turn the controller until "Service requirements" is highlighted, then press to activate.

- Turn the controller until "§ Vehicle inspection", for example, is highlighted, then press to activate.

- Enter the appointment by turning and pressing the controller and then confirm by pressing.

## Workshop Exercise  - Personal Profile

*Using an instructor assigned vehicle, perform the following tasks.*

**1)** Unlock the vehicle with the remote control and access KL15. and engine off. Access the Personal Profile main menu in the CID.

*Note which personal profile setting is currently active below.*

_____

_____

_____

**2)** Highlight another personal profile setting and select it.
*What message, if any appears before the profile is applied?*

_____

_____

*Select OK to apply the profile.*
*Note any observations to the vehicles status below.*

_____

_____

_____

_____

_____

**3)** Repeat step 2 with the engine running. Are the same results achieved? and why?

_____

_____

_____

_____

_____

**4)** List the procedure to export the current vehicle profile being used to a USB stick via the USB port in the glovebox.

_____

_____

_____

_____

**5)** Access the options menu of the profile settings. List the options available under "profile settings".

_____

_____

_____

_____

NOTES PAGE

# Climate Control

The new 4-zone IHKA system is similar (in operation) to the system used on E70 and E71 vehicles. The F01/F02 heating and air conditioning system has been enhanced in terms of heating/cooling capacity, airflow distribution, noise and convenience when compared with the previous 7 Series system.

The (IHKA) Integrated automatic climate control system is available in the following versions:

- IHKA (4-zone)

  The (IHKA) Integrated automatic climate control with rear climate control (FKA) is a 4-zone system. The climate control can be individually set for 4 separate zones of the passenger compartment according to the four control points.

## IHKA (4-zone)

The IHKA (4-zone) has an additional control panel and control unit in the rear passenger compartment and thus also provides the rear passengers with the facility for fully automatic control of temperature, air flow rate and airflow distribution with a choice of 5 intensity levels.

The IHKA climate-control unit is equipped with 15 stepper motors.

There is also an extra fan for the rear passenger compartment in the center console.

PTC heater elements in the rear footwell ducts make it possible to boost the individual air outlet temperature for the rear passengers.

The rear passengers have the facility for adjusting the air temperature from the rear center air vent and separately for the left and right B-pillar vents by means of two stratification adjusters (potentiometers) on the rear center air vent.
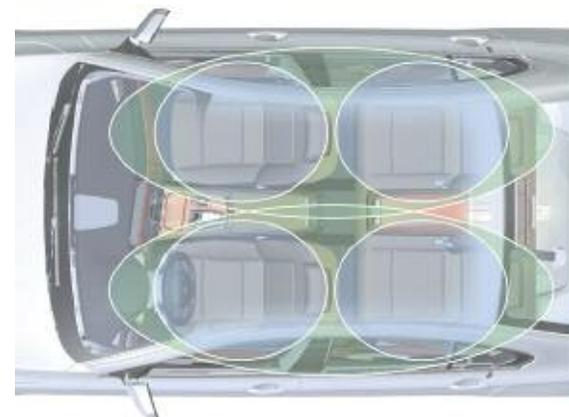


**IHKA 4 zone explanation.**

**F01/F02 climate control system**
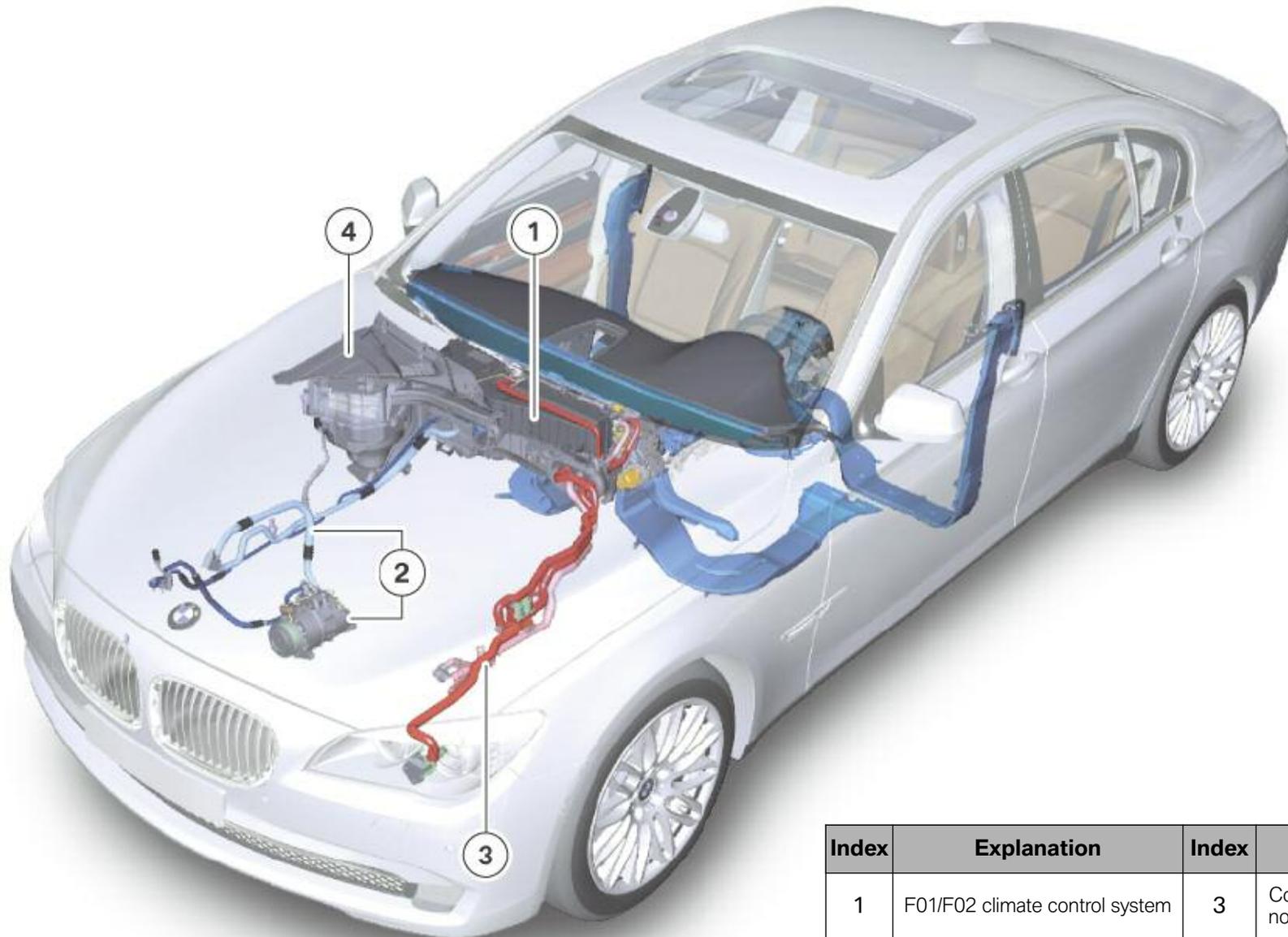


| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | F01/F02 climate control system | 3 | Coolant pipes and double sole-noid valves for the heater matrix |
| 2 | A/C compressor with intake and pressure lines | 4 | Fan for climate control system with fresh-air intake in engine compartment |

**Integrated automatic climate control 4-zone climate control**
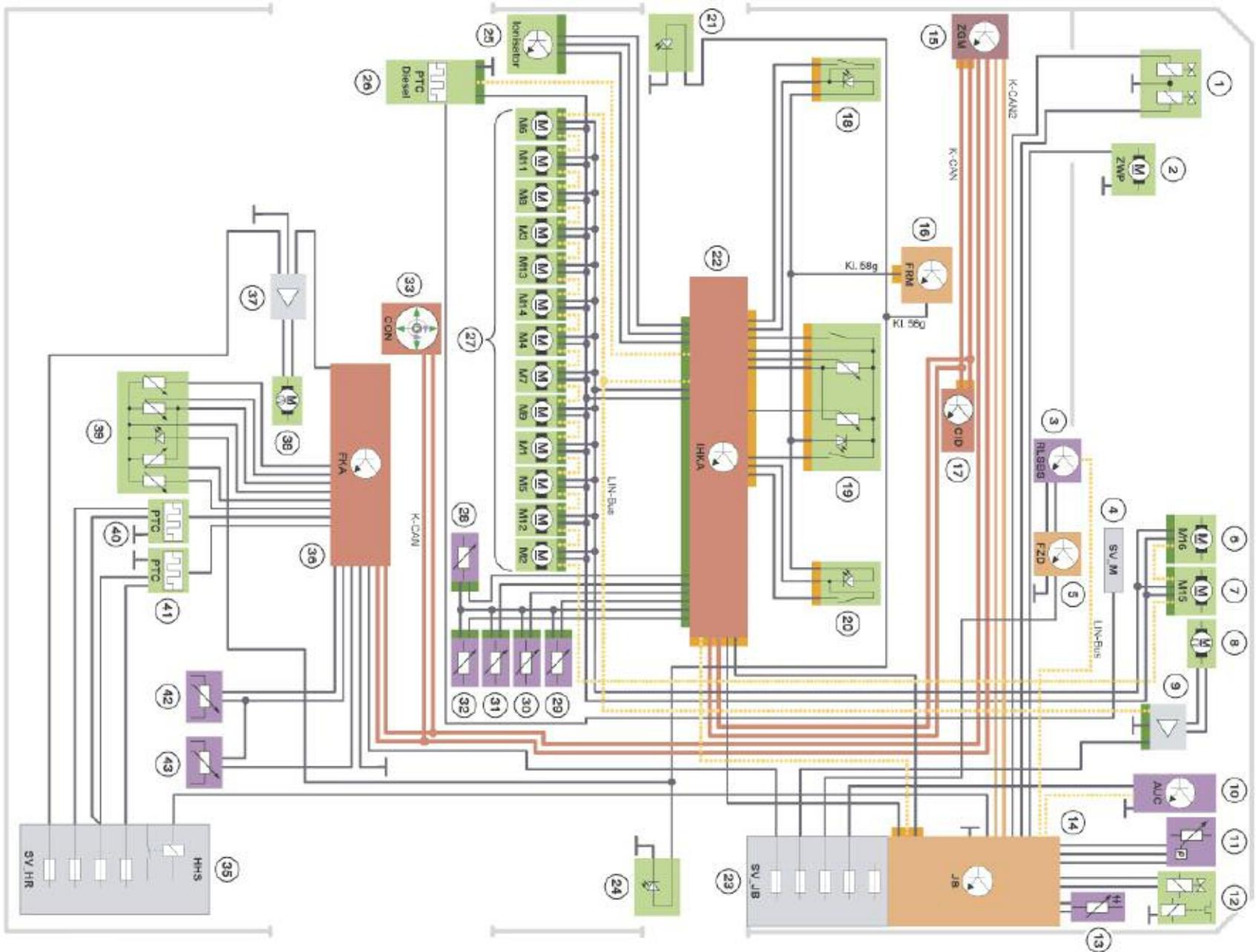
| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Double solenoid valves for coolant supply to heater matrix, left/right | 23 | Front power distribution box |
| 2 | Electric auxiliary water pump (ZWP) | 24 | Right B-pillar vent illumination |
| 3 | IHKA w/FKA: rain/light/solar/condensation sensor, (RLSBS) | 25 | Air ionizer on climate-control unit |
| 4 | Not for US | 26 | Not for US |
| 5 | Roof function center (FZD) | 27 | Stepper motors for automatic airflow distribution on climate control unit IHKA thirteen stepper motors |
| 6 | Servo motor for fresh air/ram air on air fan in engine compartment | 28 | Air temperature sensor, front center left |
| 7 | Servo motor for recirculated air on air fan in engine compartment | 29 | Air temperature sensor, front center right |
| 8 | Fresh air/recirculated air fan motor | 30 | Left heater matrix temperature sensor |
| 9 | Output stage for fresh air/recirculated air fan motor | 31 | Right heater matrix temperature sensor |
| 10 | AUC sensor for automatic recirculated air control | 32 | Evaporator temperature sensor |
| 11 | High-pressure sensor for air conditioner refrigerant circuit | 33 | Controller |
| 12 | Air-conditioning compressor with magnetic clutch and control valve | 34 | Not for US |
| 13 | Outside temperature sensor | 35 | Rear right power distribution box with HHS relay |
| 14 | Junction Box electronics (JB) | 36 | IHKA FKA control panel and control unit with interior temperature sensor |
| 15 | Central Gateway Module (ZGM) | 37 | IHKA output stage for FKA center-console fan |
| 16 | Footwell module (FRM), Terminal 58g | 38 | IHKA FKA center-console fan |
| 17 | Central information display (CID) | 39 | IHKA rear center air vent, left/right airflow stratification potentiometer, left/right temperature sensor and adjuster illumination |
| 18 | IHKA left side vent limit switch and illumination | 40 | IHKA w/ FKA: PTC heater element in rear left footwell vent duct |
| 19 | IHKA front center air vent, left/right airflow stratification potentiometer, left/right limit switch and illumination | 41 | IHKA w/ FKA: PTC heater element in rear right footwell vent duct |
| 20 | IHKA right side vent limit switch and illumination | 42 | IHKA w/ FKA: temperature sensor in rear left footwell vent duct |
| 21 | Left B-pillar vent illumination | 43 | IHKA w/FKA: temperature sensor in rear right footwell vent duct |
| 22 | Heating and air conditioning system/audio control panel IHKA control panel and control unit with interior temperature sensor | | |

# IHKA Components

The IHKA 4-zone system is recognizable in the vehicle by the additional FKA climate control panel in the rear. Above the FKA control panel the IHKA system has an air vent with two airflow stratification adjusters (left/right).

**Components of the 4-zone IHKA system**
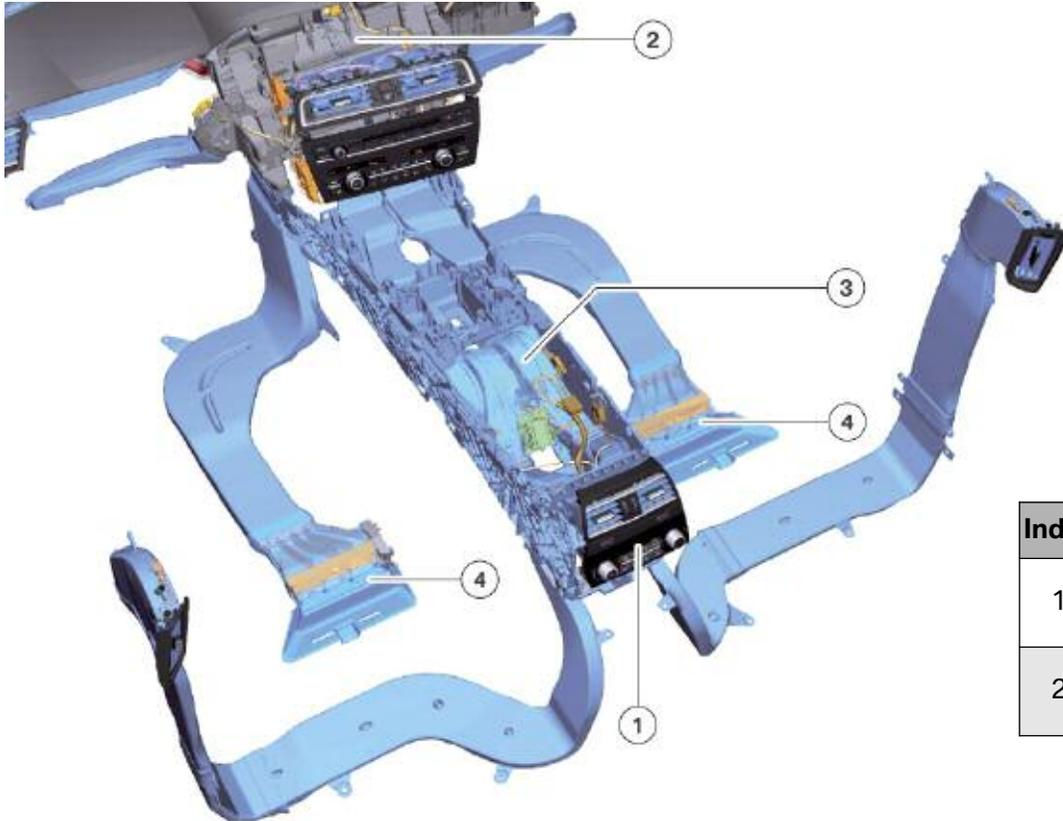


The IHKA 4-zone climate-control unit has 15 stepper motors for automatic airflow control.

In the center console there is an additional fan for supplying air to the rear.  The rear footwell ducts are each fitted with a PTC heater element.

| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | Control panel for FKA rear climate control and center rear air vent | 3 | FKA fan in center console |
| 2 | IHKA HIGH climate-control unit with 15 stepper motors | 4 | Left/right rear footwell PTC heater elements |
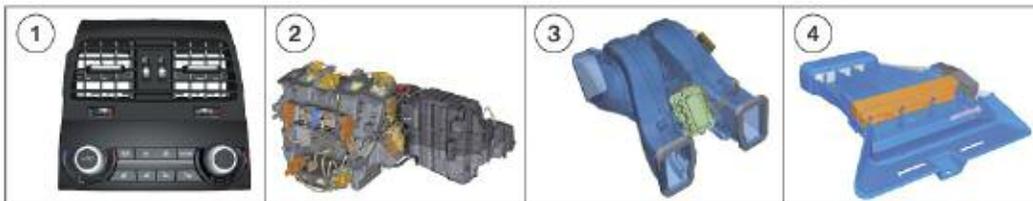
## IHKA Control Panel

The control panels and control units of the climate control systems on the F01/F02 are combined units incorporating the audio systems control panel.

All equipment options on the F01/F02 provide separate temperature controls for the left and right sides. The driver and front passenger can select separate automatic programs.

In order to be able to cater for the different heating/air conditioning preferences of as wide a range of customers as possible, the automatic mode on the F01/F02 climate control offers a choice of 5 different levels of intensity for the automatic program.

Automatic mode is activated by pressing the AUTO button.

The intensity level is selected by repeatedly pressing the "Fan speed" rocker button when Automatic mode is active.

The "ALL" button can be used to synchronize the temperature, AUTO mode intensity or air flow rate and airflow distribution settings for all 4 zones with the settings for the driver.

Some of the possible control scenarios on the control panels of the climate control systems are illustrated below.

The residual heat (Rest) feature is accessed in the same way as on E70/E71, by pressing the "high" side of the driver's fan button.

| Index | Explanation |
|-------|-------------|
| 1 | IHKA control panel, Automatic mode for driver and front passenger |
| 2 | IHKA control panel, Automatic mode for driver, manual mode for front passenger |
| 3 | IHKA control panel, Automatic mode for driver, climate control off for front passenger |

## FKA Control Panel

The addition of the extra control panel and control unit for the rear passengers realizes the 4-zone IHKA.

The 4-zone system has four control points for individually adjusting the climate control settings.

The automatic program with its 5 intensity settings can also be selected in the rear seats.

The intensity level in automatic mode for the rear passengers is selected and set by pressing the fan rocker button.

### FKA control unit panel on F01/F02



The rear passengers can adjust the temperature separately for the left and right sides of the rear passenger compartment.

Temperature sensors located on the air flow of the rear center air outlets monitor the air outlet temperature while stratification potentiometers mounted below the vents of the rear center air outlets are used to fine tune the individual temperature settings.

### Rear center air vent on F01/F02
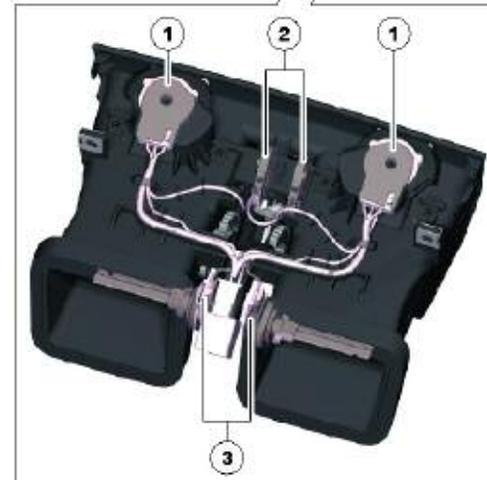


| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | IHKA rear center air vent left/right airflow stratification potentiometer | 3 | Temperature sensor |
| 2 | Adjuster with illumination | | |

To optimize the overall climate control package and as a noise reduction measure, the main blower fan for the IHKA has been placed in the engine compartment.

The fresh air is drawn in through the cowl between windshield and hood. It then passes through a coarse filter in the climate control fan housing before entering the IHKA system.

The fan draws in the recirculated air from the passenger compartment through an opening in the lower bulkhead.

The air flows through a flap between the fan motor and the climate control housing into the filter housing.

In the filter housing, the fresh or re-circulated air is filtered by two combination filters (with activated charcoal) before it continues on to the evaporator and heater core.

Depending on the IHKA settings and the inside and outside temperatures, the air is initially cooled and dried by the evaporator and, if necessary, then re-heated by the heater core before it is sent to the outlet vents.

**F01/F02 Fan Motor Housing**



**F01/F02 Climate Control Housing**
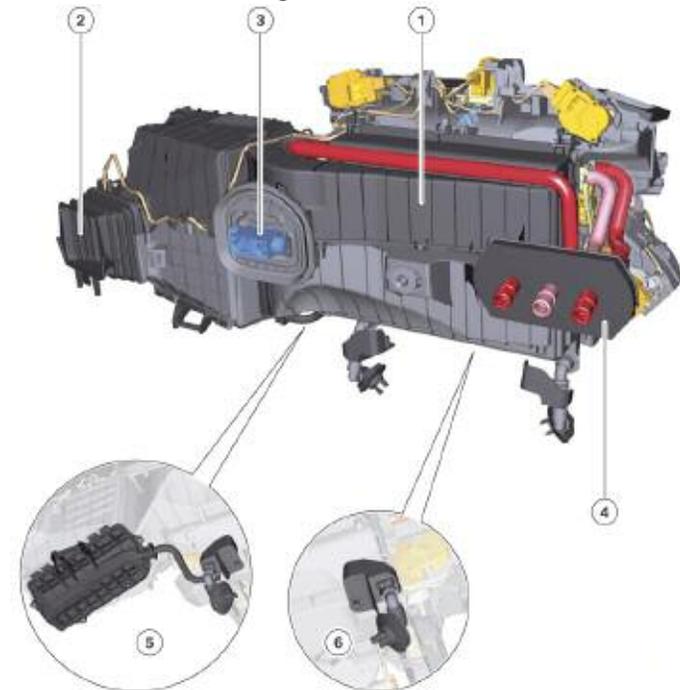


| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | Fresh air intake | 4 | Fresh-air/ram air stepper motor |
| 2 | Recirculated air intake | 5 | Recirculated air stepper motor |
| 3 | Air outlet flap to climate control housing | | |

| Index | Explanation | Index | Explanation |
|---|---|---|---|
| 1 | F01/F02 climate control housing | 4 | Pipe connections for heater core |
| 2 | Air inlet via flap | 5 | Right condensation drain from filter and climate control housings |
| 3 | Connection for refrigerant circuit/expansion valve | 6 | Left condensation from climate control housing |

# Air Ionizer

The air Ionizer used in the F01/F02 is the latest technical innovation in the area of heating and air conditioning.

The air ionizer is positioned upstream of the evaporator and it is activated as necessary when the vehicle is stationary.

By partial ionization of the air the formation of bacteria on the evaporator surface and the associated odor is prevented.

The air ionizer is a separate component which fits onto the climate-control unit with bayonet connection and is positioned in the air stream to the evaporator.

It essentially consists of a planar module, a flat ceramic plate which is covered by hard glass with printed electrical conductors located on the front and back of the component.

Applying a high voltage generated internally in the ionizer partially ionizes the air.

The chemical reaction between the ionized air and the condensed water produces hydrogen peroxide in the evaporator housing, which kills bacteria and germs on the evaporator and thus prevents the formation of unpleasant odors that could enter the vehicle interior.

The IHKA decides when and whether to operate the air ionizer, based on the ambient and operating conditions of the climate control system.

The air ionizer is operated for a period of several minutes by a control signal from the IHKA.

Operation takes place as required only during the overrun period after Terminal 15 is turned OFF and the vehicle is locked.

The maximum power consumption of the unit is 850 mA.

The power supply for operating the air ionizer is through a three-pin connector on the climate control wiring harness.

Communication with the IHKA control panel takes place by means of a control signal via a bidirectional cable connection.

| Index | Explanation | Index | Explanation |
|-------|-------------|-------|-------------|
| 1 | F01/F02 climate control housing | 3 | Air ionizer |
| 2 | Filter housing | | |

# IHKA Stepper Motors

The IHKA housing incorporates the evaporator, heater core and all the air flaps necessary to control the climate in the vehicle.

The air flow needs to be filtered, temperature regulated and properly distributed to the air outlets.

This is all done within the IHKA housing with the aid of a system of stepper motors.

For higher performance in terms of rear air conditioning, the IHKA 4-zone climate-control unit has 15 stepper motors for automatic airflow distribution.
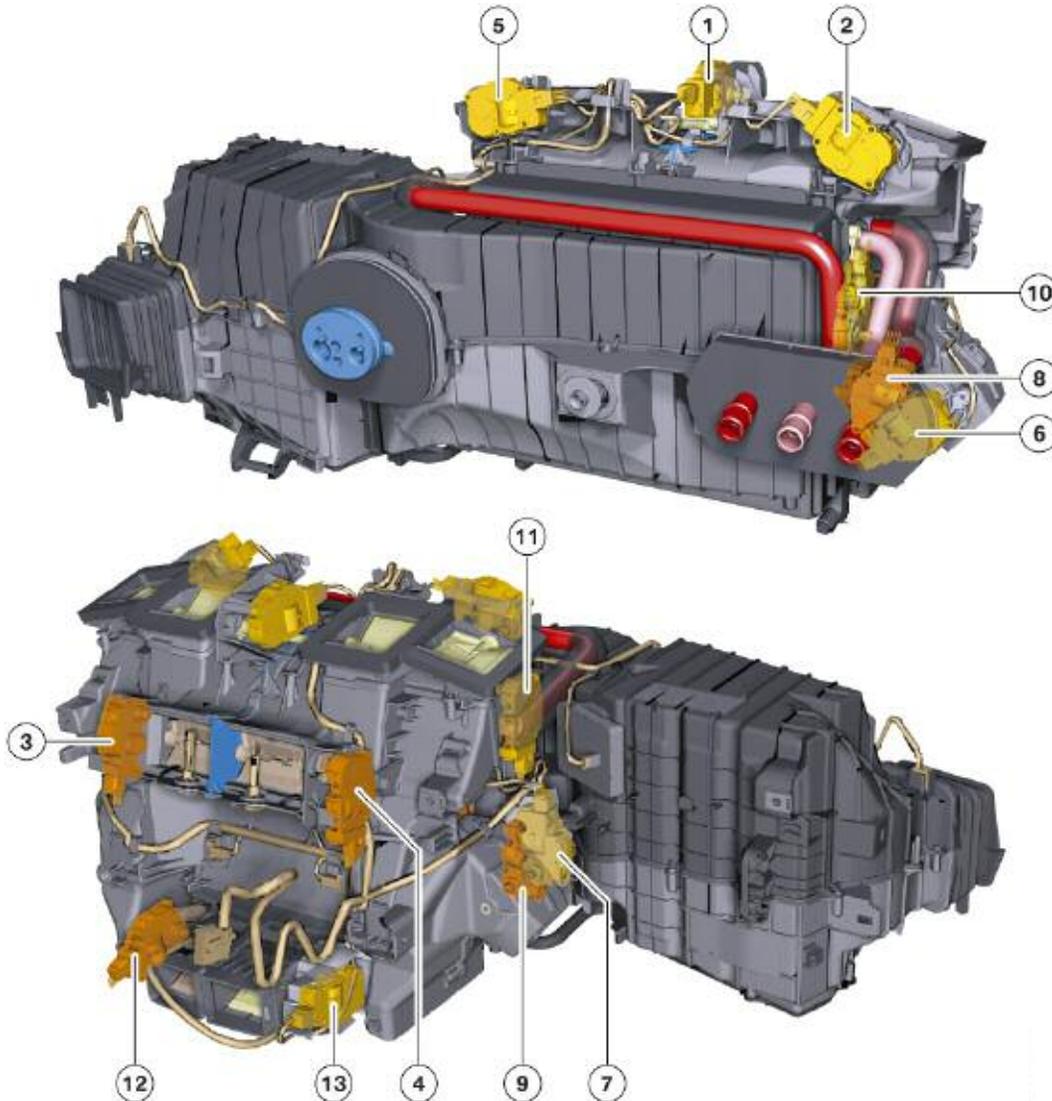


**IHKA 4-zone Climate Control Stepper Motors**

| Index | Explanation |
|-------|-------------|
| 1 | Stepper motor for defrosters |
| 2 | Stepper motor for left outer air vent |
| 3 | Stepper motor for left center air vent |
| 4 | Stepper motor for right center air vent |
| 5 | Stepper motor for right outer air vent |
| 6 | Stepper motor for left front footwell |
| 7 | Stepper motor for right front footwell |
| 8 | Stepper motor for left rear footwell |
| 9 | Stepper motor for right rear footwell |
| 10 | Stepper motor for left front stratified airflow |
| 11 | Stepper motor for right front stratified airflow |
| 12 | Stepper motor for left rear stratified airflow |
| 13 | Stepper motor for right rear stratified airflow |
| 14 | Stepper motor for recirculated air (on fan motor housing) |
| 15 | Stepper motor for fresh/ram air (on fan motor housing) |

# Front Center Air Vent with Variable Airflow

The front center air vent incorporates a variable airflow focus feature. It allows the airflow focus to be individually varied between spot-focussed and diffused mode settings.

**Center front fresh-air vent with variable airflow focus on 01/F02**
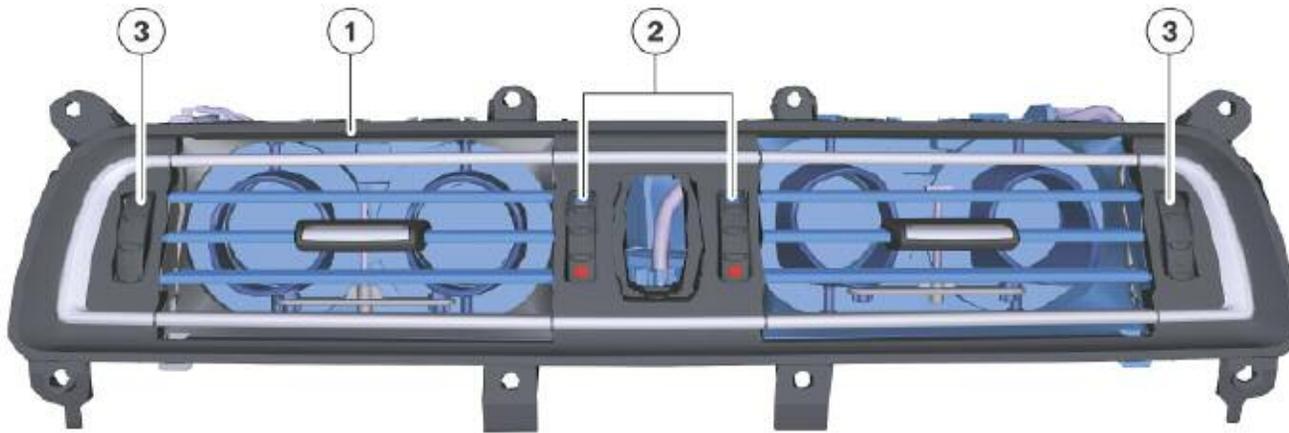
| Index | Explanation |
|-------|-------------|
| 1 | IHKA center front fresh-air vent |
| 2 | Center front airflow stratification controls |
| 3 | Spot/diffuser airflow adjusters |
| A | Spot-focussed airflow setting |
| B | Diffused airflow setting |
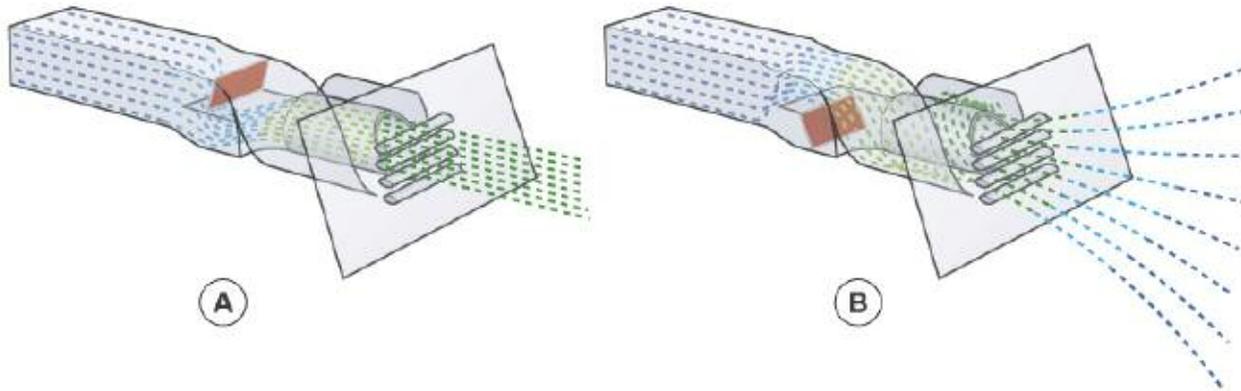
# Workshop Exercise - F01/F02 Climate Control Systems

*Please answer the following questions regarding F01/F02 Climate Control.*



What component is the technician removing in the illustration above?
**Select the best possible answer**

- ❑ Fresh air stepper motor
- ❑ Ionizer
- ❑ Spot/diffuser airflow adjuster
- ❑ PTC heater

Select the two stepper motors that are located on the fan motor housing? **Select more than one answer.**

- ❑ Defroster
- ❑ Left footwell
- ❑ Fresh air
- ❑ Right footwell
- ❑ Recirculated air

How many stepper motors are used in the 4-zone IHKA system? **Select the best possible answer**

- ❑ 4
- ❑ 9
- ❑ 12
- ❑ 15

What is the purpose of the ionizer?

_____

_____

_____

What conditions must be met in order for IHKA to run the Ionizer?

_____

_____

_____

## Workshop Exercise  - F01/F02 Climate Control Systems

*Locate the following components at the vehicle and complete the table below.*

| Component | Mounting Location |
|---|---|
| Condenser | |
| Dryer | |
| Compressor | |
| Water valves | |
| Expansion valve | |
| Evacuation & Service Port | |
| IHKA blower | |
| FKA blower | |
| Course filter | |
| AUC sensor | |
| Solar sensor | |
| Ionizer | |
| Micro filter | |

*Access the fresh air  and  the recirculation air charcoal  filters.*

*What tools are needed to remove and replace these two filters?*

## Workshop Exercise  - F01/F02 Climate Control Systems

*Using an Instructor assigned F01/F02 and the ISTA BMW Diagnostic Equipment.*
*Locate the following sensor readings and the control unit where you found them and complete the table below.*

| Component | Control Unit | Reading |
|---|---|---|
| Heater core sensor  - right | | |
| Heater core sensor  - left | | |
| Ventilation temperature sensor - right | | |
| Ventilation temperature sensor - left | | |
| Solar sensor - right | | |
| Solar sensor - left | | |
| AUC sensor | | |
| Evaporator temperature sensor | | |
| Refrigerant pressure sensor | | |
| Fogging sensor - air humidity | | |
| Fogging sensor - air temperature | | |
| Rear cabin stratification adjuster | | |
| Air conditioning compressor | | |

*Note the path in the ISTA diagnostic equipment you used to retrieve the information.*

## Classroom Exercise - Review Questions

1.      How many intensity programs does the F01/F02 IHKA system have?

_____

_____

_____

2.      What is the maximum power consumption of the Ionizer?

_____

_____

_____

3.      Through how many filters does the fresh air pass as it circulates through the IHKA system?

_____

_____

_____

4.       Does the F01/F02 IHKA system use a water valve?  If so, how many and why?

_____

_____

_____

5.      What is the purpose of the "ALL" button on the F01/F02 IHKA system?

_____

_____

_____